McKinsey Global Institute

China and the world

Inside the dynamics of a changing relationship

July 2019

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July 2019

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Preface

The relationship between China and the rest of the world appears to be entering a new phase. China's economic miracle was fueled by industry and investment, but today domestic consumption is the main driving force of growth. The country is becoming less exposed in economic terms to the rest of the world. However, reflecting China's rise to being the world's second-largest economy and its leading trading nation, the rest of the world is becoming more exposed to China. These shifts have been accompanied by trade tensions and rising protectionism in many countries, raising the question whether we have reached a point of peak integration between China and the world.

In this report, we look at the extent of China's global scale and integration, and highlight the findings of the new McKinsey Global Institute China-World Exposure Index. We examine the exposure of sectors and countries to the China-world relationship, with particular emphasis on the technology and consumer sectors. Finally, we simulate what value might be at stake for China and the rest of the world from less engagement and from more engagement, and briefly explore how businesses might navigate what may be a highly uncertain environment. This report is part of a series of MGI publications on global trade that includes *Digital globalization: The new era of global flows* in March 2016 and *Globalization in transition: The future of trade and value chains* in January 2019.

This research was led by Jonathan Woetzel, a director of MGI based in Shanghai, and Jeongmin Seong, an MGI senior fellow in Shanghai; Nick Leung, McKinsey senior partner and chairman of McKinsey Greater China; and Joe Ngai, McKinsey senior partner and managing partner of McKinsey Greater China; James Manyika, chairman and director of MGI in San Francisco; Anu Madgavkar, MGI partner in Mumbai; and Susan Lund, MGI partner in Washington, DC. Andrey Mironeko and James Bien led the research team, which comprised Mo Chen, Carmen Liu, Meng Meng, Raye Qin, Erik Rong, Ben Wang, and Minyu Xiao. We are also grateful for the input and guidance of Rik Kirkland, McKinsey partner for global publishing in London; Glenn Leibowitz, McKinsey's group head of external relations in Greater China; and Ziad Haider, head of risk for McKinsey, Asia.

Our academic and external advisers challenged our thinking and added new insights. We extend sincere thanks to Martin Baily, Bernard L. Schwartz Chair in Economic Policy Development and senior fellow and director of the Business and Public Policy Initiative at the Brookings Institution; Gordon Orr, director emeritus and senior adviser to McKinsey; Dr. Andrew Sheng, distinguished fellow of the Asia Global Institute; and Nicholas R. Lardy, Anthony M. Solomon Senior Fellow at the Peterson Institute for International Economics. We thank the many business leaders, policy makers, and researchers at public and private institutions who shared their insights confidentially.

This project benefited immensely from the industry expertise of many McKinsey colleagues. We thank Stefan Burghardt, Albert Chang, Wonsik Choi, Michael Chui, Karel Eloot, Paul Gao, Mingyu Guan, Patrick Hertzke, Sheng Hong, Forest Hou, Richard Huang, Daniel Hui, Mekala Krishnan, Gang Liang, Lan Luan, Katrina Lv, Felix Poh, John Qu, Dennis Schwedhelm, Sha Sha, Yezhou Shi, Antonio Sun, Florian Then, Christopher Thomas, Jin Wang, Ting Wu, Alex You, Cherie Zhang, Derek Zhang, Haimeng Zhang, Susan Zhang, Gaobo Zhou, Tiankai Zhu, and Daniel Zipser.

This report was produced by MGI senior editor Janet Bush, editorial production manager Julie Philpot, and senior graphic designers Marisa Carder and Patrick White, with support from Cathy Gui, MGI's head of external relations in Asia Pacific; Lauren Meling, MGI digital editor; and Timothy Beacom, MGI content specialist.

This report contributes to MGI's mission to help business and policy leaders understand the forces transforming the global economy and prepare for the next wave of growth. As with all MGI research, this work is independent, reflects our own views, and has not been commissioned by any business, government, or other institution. We welcome your comments on the research at MGI@mckinsey.com.

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July 2019

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China and the world: Inside the dynamics of a changing relationship

China has made progress in integrating with the world economy, achieving true global scale as a trading nation, but not in other areas such as finance. Now the relationship between China and the rest of the world is changing. A great deal of value could be at stake depending on whether there is more or less engagement. Businesses will need to adjust their approach to navigate the uncertainties ahead.

— China, which became the world's largest economy in purchasing-power-parity terms in 2014, is a global power in scale but not always in global integration. It became the world's largest trading nation of goods in 2013. However, although China has 111 Global Fortune 500 companies, more than 80 percent of their revenue is still earned at home. China's banking, securities, and bond markets rank in the global top three in size, but international players have limited presence.

— The relationship between China and the world is changing. On the new McKinsey Global Institute China-World Exposure Index, China's exposure to the world in trade, technology, and capital has fallen in relative terms. Conversely, the world's exposure to China has increased. This reflects the rebalancing of the Chinese economy toward domestic consumption. In 11 of the 16 quarters since 2015, consumption contributed more than 60 percent of total GDP growth. Exposure to China varies significantly among sectors and geographies, according to our analysis of 20 sectors and 73 economies.

— China's technology value chains are highly integrated globally. Our analysis of 81 technologies in 11 categories found that more than 90 percent of technologies used in China follow global standards. Our study of three value chains suggests that Chinese players have grown rapidly, but they still import critical components such as reduction gears (robotics), power electronics (electric vehicles), and equipment (semiconductors).

— China's consumer market is likely to remain buoyant on the back of rising incomes. The level of integration with the world in a range of consumer categories is already high, with scope for even more. The penetration of multinational corporations in Chinese consumer markets is almost double the penetration in US markets, but they are now facing competition from domestic players. Of 30 consumer categories, multinationals have lost share in 11. Two trends offer further opportunities for domestic and foreign players. First, Chinese consumers are demanding more and better choices in goods and services. Second, more Chinese people are traveling abroad. Outbound trips have grown at 13 percent per year since 2010 and reached 150 million in 2018.

— Our simulation shows that $22 trillion to $37 trillion of economic value (equivalent to about 15 to 26 percent of global GDP by 2040) could be at stake from less or more engagement between China and the world in five areas: (1) growth as an import destination; (2) liberalization of services; (3) globalization of financial markets; (4) collaboration on global public goods; and (5) flows of technology and innovation. Less engagement between China and the world could mean higher tariffs, more limited trade and technology flows, and continuing gaps in addressing key global challenges. More engagement could see China importing more from the rest of the world, greater two-way flows of technology, and a more competitive Chinese services sector; reaching solutions to global issues would be more likely. In both scenarios, different stakeholders could experience upsides and downsides as well as conflicting priorities.

— Businesses may need to adjust their approach to uncertain, and potentially higher, risk conditions. We suggest four areas for consideration: (1) assess their short- and long-term exposure to the China-world relationship; (2) determine their investment and value chain posture; (3) develop the operational excellence needed to manage risks and uncertainty; and (4) adopt a "survivor's mind-set," both optimistic and realistic, improving their balance sheet and maintaining robust access to capital, and looking for opportunities to acquire and restructure amid the uncertainty.

China and the world: A changing relationship

China has achieved global scale, but more can be done to integrate

Trade
11% of global goods trade

However...

6% of global services trade

Firms
111 Global Fortune 500 companies

However...

<20% revenue earned overseas

Capital
Top 3 financial system

However...

<6% of foreign ownership

People
150m outbound trips

However...

0.2% of global migrants

Technology
2nd in the world on R&D spending

However...

6x more IP imports than exports

Data
802m internet users

However...

20% of US cross-border data flows

Environment
45% of global renewables investment

However...

28% of world carbon emissions

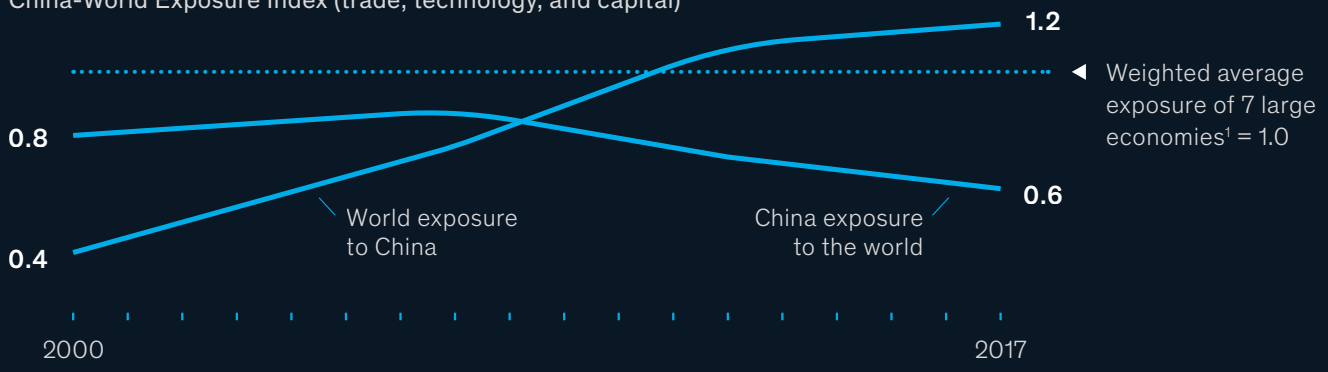
Culture
2nd largest box office in the world

However...

1/3 of South Korean TV drama exports

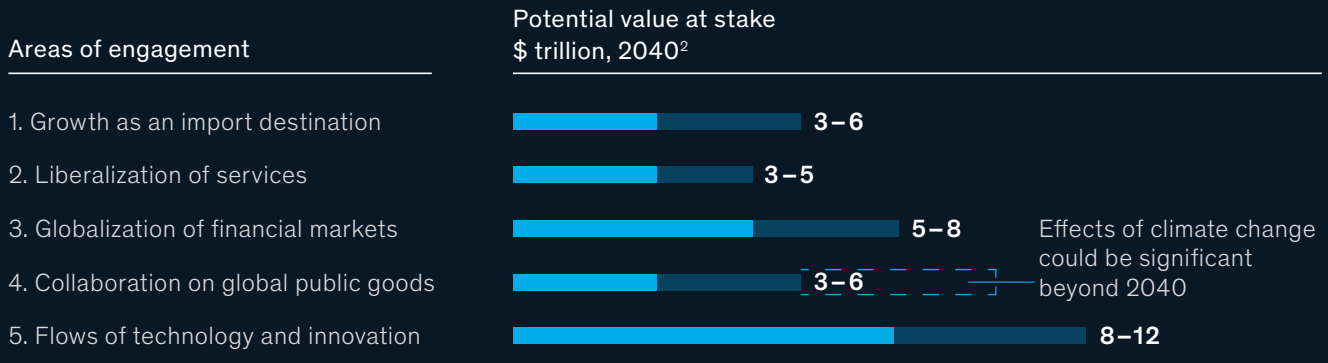
China has been reducing its exposure to the world, while the world's exposure to China has risen

China-World Exposure Index (trade, technology, and capital)



Significant value is at stake from less or more engagement between China and the world

Simulated impact, 2040



Between $22 trillion and $37 trillion of economic value (equivalent to about 15 to 26 percent of global GDP by 2040) could be at stake from less or more engagement between China and the world

[1] China, Japan, Germany, France, India, United Kingdom, and United States.
[2] Estimated value at stake based on specific conditions and assumptions, and should not be taken as a forecast.

Source: McKinsey Global Institute analysis

Executive summary

China's growth took off when it began to connect its economy to those of the rest of the world, and when it embraced a market-based system and global best practices of foreign partners. China today is a global power in scale. It became the world's largest trading nation in goods in 2013; has 111 Global Fortune 500 companies, comparable with the US tally; and is in the world's top two for receiving and being the source of foreign direct investment (FDI).

However, not all dimensions of China's scale have translated into global integration. A huge majority of Chinese firms' revenue still comes from the home economy. Operational and regulatory complexities in China's financial markets remain a barrier to international players. Cross-border data flows tend to be limited despite the massive amount of data China's digital ecosystem generates.

China's opening and reform have offered economies in the rest of the world large benefits. Consumers have benefited from lower prices due to Chinese imports, and multinational corporations have tapped into new sources of growth in China's quickly expanding, dynamic market. However, the evolution has entailed costs, too, notably in the form of lost middle-income jobs, particularly in advanced economies.

The relationship between China and the world now is changing. The new McKinsey Global Institute (MGI) China-World Exposure Index shows that the world's exposure to China has increased, while China's exposure to the world has fallen in relative terms. Accompanying this shift are the beginnings of a reevaluation of the relationship. Trade disputes are making daily headlines, new rules are emerging to scrutinize technology flows, protectionism is on the rise, and geopolitical tensions are becoming more heated. Could we be seeing the beginning of a trend of less engagement between China and the world after the years of deepening ties? Could we be witnessing peak integration? Conversely, what opportunities could more engagement offer? What value could be at stake for all players? How should businesses navigate what is likely to be an increasingly uncertain environment?

In this report, we examine the state of China's globalization on eight dimensions (chapter 1) and discuss shifts in the mutual exposure of China and the rest of the world, looking in detail at sectors and countries (chapter 2). We then look in particular detail at technology (chapter 3)—which is central to the economic development of all economies, including China's—and consumer markets, which are now the main engine of China's growth, and arguably one of the main sources of global growth (chapter 4). In chapter 5, we discuss the value at stake from less and more engagement between China and the world. Finally, in chapter 6, we explore how business executives may consider adjusting their approach in the face of the shifting relationship between China and the world. We note that this analysis builds on MGI's earlier research on shifting global value chain that discusses "the new China effect" driving global demand growth and reaching a new level of industry maturity.[1]

China is a global power in scale, but scale has not always translated into global integration

China became the world's largest economy in purchasing-power-parity terms in 2014. In nominal terms, China's GDP was 66 percent that of the United States in 2018, making it the second-largest economy in the world. On the MGI Connectedness Index that ranks participation by flows of goods, services, finance, people, and data, China was the ninth-most-connected country in the world in 2017.[2] In 2018, China accounted for about 16 percent of world GDP.

1 *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.
2 *Digital globalization: The new era of global flows,* McKinsey Global Institute, March 2016.

Exhibit E1

China has achieved global scale, but more can be done.

	China's scale	More room to globalize further
Trade	China has been the world's largest goods trading nation since 2013, accounting for 11.4% of global goods trade in 2017	… but China accounted for only about 6.4% of global services sector trade in 2017
Firms	China has 111 Global Fortune 500 companies, comparable with the United States	… but those companies are still anchored in the domestic market (18% of revenue earned overseas vs 44% for S&P 500 firms)
Capital	China has a large financial system (the largest banking system, and second- and third-largest stock and bond markets, respectively)	… but cross-border flows (3–4x smaller than US flows) and foreign participation are limited (foreign ownership is less than 6% in banking, stock, and bond markets)
People	China is the world's largest source of outbound students (17% of international tertiary degree students in 2017) and tourists (Chinese tourists made 150 million outbound trips in 2018, the most in the world)	… but people flows are still geographically concentrated (~60% of outbound students go to the United States, Australia, and the United Kingdom), and migrant flows to China are only 0.2% of global total
Technology	China has invested heavily in its R&D (the world's second-largest spender with $293 billion in 2018)	… but still relies heavily on imported technology (more than half of technology import contracts come from just three countries) and intellectual property (China's IP imports are six times larger than exports)
Data	China has the most internet users in the world (more than 800 million), generating huge amounts of data	… but cross-border data flows are limited (8th highest in the world, but only 20% of US flows)
Environmental impact	China accounts for 45% of global renewables investment	… but it is still the world's largest source of carbon emissions (28% of total)
Culture	China has invested heavily in developing global cultural presence (12% of top 50 world movies shot in China in 2017 vs 2% in 2010)	… but cultural reach is still relatively limited (exports of television dramas are only one-third of South Korea's)

Source: McKinsey Global Institute analysis

However, China's journey to global prominence has been uneven. To gauge the extent of its integration with the world, we look at eight dimensions of China's global scale and integration (Exhibit E1).

— **Trade.** China has become a major global player in trade as a supplier and as a market. The country became the world's largest exporter of goods in 2009, and the largest trading nation in goods in 2013. Its share of global goods trade increased from 1.9 percent in 2000 to 11.4 percent in 2017. In an analysis of 186 countries, China is the largest export destination for 33 countries and the largest source of imports for 65. However, trade exposure to China varies substantially by region and sector. China has a disproportionately high impact on specific regions (particularly those close by) and sectors, notably those with globally integrated technology chains, and resource-exporting sectors for which China is a big market. China became the world's fifth-largest exporter of services with $227 billion of exports in 2017, triple the value in 2005. China also imported $468 billion in services in 2017, making it the second-largest services importer in the world. However, China's global scale in services trade is not as significant as in goods. China accounts for 6.4 percent of global services trade, about half that of goods trade. Globally, services trade is growing 60 percent faster than goods trade.[1]

[1] *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.

— **Firms.** The number of Chinese firms operating around the world has grown at an estimated 16 percent a year since 2010, from 10,167 to 37,164, according to China's Ministry of Commerce, and this is likely an underestimate. Some Chinese firms have achieved global scale. Consider that in 2018, the Global Fortune 500 included 111 firms from mainland China and Hong Kong, near the US total of 126. In 2018, MGI found that China accounted for 10 percent of global firms in the top 1 percentile of economic profit in 2014 to 2016, up from less than 1 percent in 1995 to 1997.[1] Although the share of these firms' revenue earned outside China has increased, less than 20 percent of revenue comes from overseas, even for these global firms.[2] To put this in context, the average share of revenue earned overseas for S&P 500 companies is 44 percent. Furthermore, only one Chinese company is among the world's 100 most valuable brands in 2018.[3]

— **Capital.** China was the world's second-largest source of outbound FDI and the second-largest recipient of inbound FDI from 2015 to 2017. However, its financial system remains far from globalized. Foreign ownership accounted for only about 2 percent of the Chinese banking system, 2 percent of the bond market, and about 6 percent of the stock market in 2018. Furthermore, in 2017, China's inbound and outbound capital flows (including FDI, loans, debt, equity, and reserve assets) were only about 30 percent those of the United States.

14x

more Chinese traveled overseas in 2018 vs 2000

— **People.** Flows of people—namely students and tourists—between China and the world are rising rapidly. China is now the largest source of outbound students (608,400, or 16 times more than in 2000) and tourists (150 million trips taken in 2018, or 14 times more than in 2000). In contrast, inbound students and tourists to China accounted for only 3 percent of the global overseas student population and 4 percent of overseas trips taken in 2017. Outbound flows of students have been highly concentrated. Only three destinations—Australia, the United Kingdom, and the United States—have accounted for about 60 percent of the total. In 2017, half of the trips taken by Chinese tourists were to the Greater China area, and an additional 29 percent to Asia. Migration flows have been small. Chinese emigrants accounted for 2.8 percent of the global total, and immigrants to China for 0.2 percent, between 1990 and 2017.

— **Technology.** China's scale in R&D expenditure has soared. Spending on domestic R&D rose from about $9 billion in 2000 to $293 billion in 2018, the second-highest figure in the world, behind the United States.[4] However, China depends on imports of some core technologies, such as semiconductors and optical devices, as well as intellectual property (IP) from abroad. In 2017, China incurred $29 billion worth of imported IP charges, while charging only about $5 billion for exported IP (17 percent of its imports).[5] China's technology import contracts are highly concentrated geographically, with more than half of purchases of foreign R&D coming from only three countries—31 percent from the United States, 21 percent from Japan, and 10 percent from Germany.

— **Data.** China is home to the world's largest population of internet users, with more than 800 million people connected to the web. However, despite recent growth, its cross-border data flows are limited. China is in the global top eight for data flows in bandwidth, but these flows are small compared with the vast size of its digital economy, at only 20 percent of US data flows.[6]

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1 *Superstars: The dynamics of firms, sectors, and cities leading the global economy,* McKinsey Global Institute, October 2018.

2 The share of revenue earned by Chinese firms in the Global Fortune 500 increased from 10 percent in 2007 to 19 percent in 2017. In 2017, US firms on the list accounted for 44 percent of revenue earned outside the United States, according to Standard & Poor's. See Howard Silverblatt, *S&P 500 2017: Global sales, S&P Dow Jones Indices*, August 2018, us.spindices.com/indexology/djia-and-sp-500/sp-500-global-sales.

3 "The world's most valuable brands," *Forbes,* forbes.com/powerful-brands/list/; and Best global brands 2018 rankings, Interbrand, interbrand.com/best-brands/best-global-brands/2018/ranking/.

4 *The China effect on global innovation,* McKinsey Global Institute, October 2015; and *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017; http://www.xinhuanet.com/english/2019-03/03/c_137865068.htm

5 "Imported" IP charges are payments China makes to other countries for their IP. "Exported" IP charges are payments China receives from other countries for domestic IP.

6 *Digital globalization: The new era of global flows,* McKinsey Global Institute, March 2016.

— **Environmental impact.** China has been the world's largest source of carbon emissions since 2006, and today accounts for 28 percent of annual global emissions (although a much lower share of the accumulated stock of greenhouse-gas emissions). The country has been investing heavily in renewable energy. In 2017, it invested about $127 billion, 45 percent of the global total and three times larger than US and European investment, each $41 billion. In addition to being motivated by its commitment as a signatory to the Paris Agreement to reduce its carbon intensity by 40 to 45 percent from 2005 to 2020—a milestone achieved by the end of 2017—China is seeking to reduce its carbon intensity because of domestic issues including pollution.[1] The median exposure of China's PM 2.5, an indicator of air pollution, was 3.7 times larger than the Organisation for Economic Co-operation and Development (OECD) average in 2016, according to the World Bank.

— **Culture.** China has invested heavily in building a global cultural presence. Consider that the number of Confucius Institutes around the world expanded from 298 in 2010 to 548 in 2017. Financing of the global entertainment industry and competitive production facilities has led to more movies being shot in China: 12 percent of the world's top 50 movies were shot at least partially in China in 2017, up from 2 percent in 2010. Despite significant investment, however, China has not yet achieved mainstream cultural relevance globally. Its exports of television dramas are only about one-third of South Korea (measured by the value of exports), and the number of subscribers to top ten Chinese musicians on a global streaming platform are 3 percent those of top ten South Korean artists, for example.

12%

of world's top movies at least partly shot in China in 2017 vs

2%

in 2010

The relationship between China and the world is changing

Looking at the mutual exposure of China and the world on trade, capital, and technology on a relative basis, we find that China's exposure is falling, while the world's exposure to China is rising.

China is becoming less exposed to the rest of the world, which, in turn, is becoming more exposed to China

Focusing on three of the eight dimensions, MGI has analyzed the mutual exposure of China and the rest of the world on trade, technology, and capital.[2] From 2000 to 2017, the world's exposure to China increased on all three, while China's exposure fell (Exhibit E2). MGI's new China-World Exposure Index measures the relative importance of these economic flows for the Chinese and global economies, compared with other large economies. The rest of the world's aggregate index rose from 0.4 in 2000 to 1.2 in 2017, while China's exposure to the world peaked at 0.9 in 2007 and declined to 0.6 by 2017.

China's declining exposure partly reflects the country's rebalancing of its economy toward domestic consumption. In 11 of the 16 quarters since 2015, domestic consumption contributed more than 60 percent of total GDP growth. In 2017 to 2018, about 76 percent of GDP growth came from domestic consumption, while net trade made a negative contribution to GDP growth. As recently as 2008, China's net trade surplus amounted to 8 percent of GDP; by 2018, that figure was estimated to be only 1.3 percent—less than either Germany or South Korea, where net trade surpluses amount to between 5 and 8 percent of GDP.[3] Rising demand and the development of domestic value chains in China also partly explain the recent decline in trade intensity at the global level. China is consuming a larger share of output produced. These are significant changes that alter China's priorities and shift the dynamics of its relationship with the world.

1 *Global trends in renewable energy investment report 2018,* United Nations Environment Programme and Bloomberg New Energy Finance, 2018.

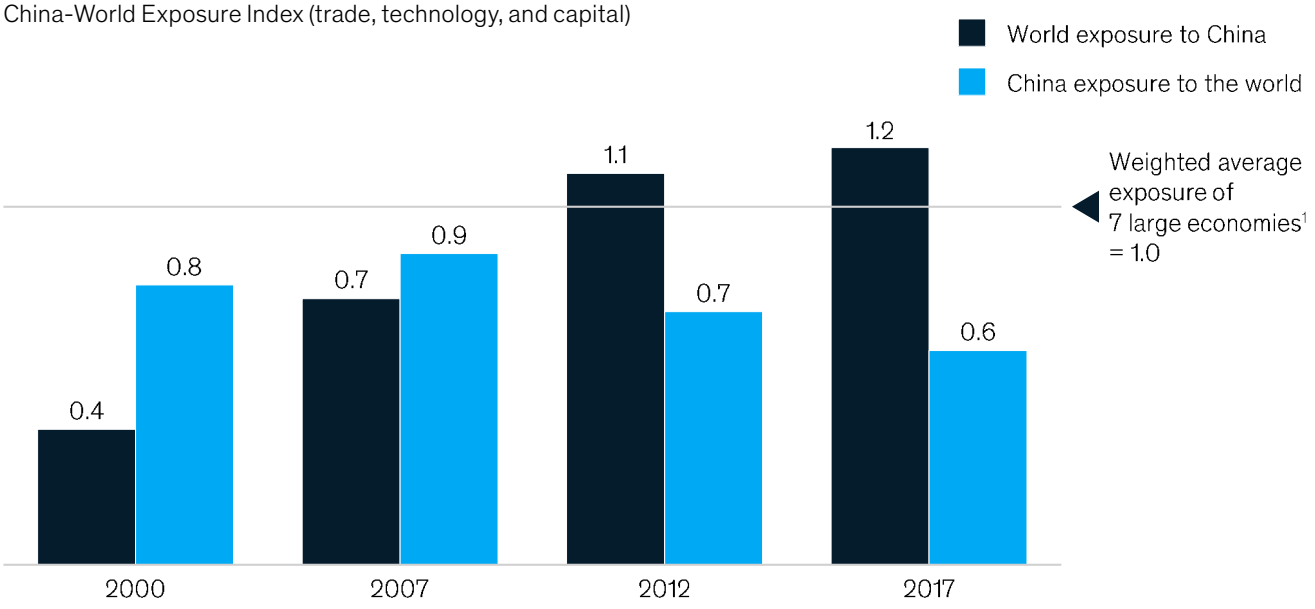
2 The index covers trade (exposure measured by a country's exports divided by rest-of-world consumption) and demand (country's imports divided by rest-of-world production); technology (country's exports of IP and technology services and equipment divided by rest-of-world R&D spending); and capital (country's outbound FDI divided by rest-of-world inbound FDI) and investment opportunities (country's inbound FDI divided by rest-of-world outbound FDI). We first measured the exposure between China and the world over the past two decades. We set a value of 1.0 as an average exposure index between the world and seven large economies (China, France, Germany, India, Japan, the United Kingdom, and the United States): a value greater than 1.0 suggests the world is more exposed to China than to the seven large economies, on average, whereas a value less than 1.0 suggests the world is less exposed to China than to the seven large economies.

3 *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.

Exhibit E2

China has been reducing its relative exposure to the world while the world has been increasing its exposure to China.

China-World Exposure Index (trade, technology, and capital)



[1] China, France, Germany, India, Japan, United Kingdom, and United States.

Source: McKinsey Global Institute analysis

The decline in China's exposure also reflects the reality that the economy is still relatively closed in comparison with developed economies. On trade, after joining the World Trade Organization (WTO), China cut tariffs from an average of 16 percent in 2000 to about 9 percent in 2009. However, the average tariff rate edged up to 10.6 percent in 2017 (although we note that it may come down again to 7.5 percent with the 2018 announcement of a new round of tariff cuts), according to data from the United Nations Conference on Trade and Development (UNCTAD).[1] In comparison, the US and European Union (EU) average tariff was around 3 to 4 percent in 2017. On capital, barriers persist. On the OECD's FDI Regulatory Restrictiveness Index for services, the index has come down to 0.39 from 0.74, but this is still far higher than the 0.08 OECD average.[2] We note that the index may not capture recent moves to ease restrictions, such as progress in adopting a "negative list" approach.[3]

The increasing exposure of the rest of the world to China reflects China's increasing importance as a market, supplier, and provider of capital. China accounts for 35 percent of global manufacturing output. Although it accounts for only 10 percent of global household consumption, it was the source of 31 percent of global household consumption growth from 2010 to 2017, according to World Bank data. Moreover, in many categories including automobiles, spirits, luxury goods, and mobile phones, China is the largest market in the world, accounting for about 30 percent (or more) of global consumption. As we have noted, it was the world's second-largest source and second-largest recipient of FDI between 2015 and 2017. However, exposure to China varies among sectors and countries, according to our analysis of 73 economies and 20 sectors.

[1] "China to cut tariffs on imports including machinery, textiles," Bloomberg News, September 26, 2018. Tariff figures are simple averages drawn from announcements collected by UNCTAD. We note that, on a weighted-average basis, enforced tariffs are lower overall, although the comparison with developed markets is still of the same order of magnitude.

[2] The OECD index was last updated in 2017, and the calculations may not capture changes to Chinese regulations since then.

[3] The negative list stipulates procedures, standards, and approvals needed before access is granted to a "restricted" market. Sectors that do not appear on the list are "permitted" and therefore have no special requirements for investors. For more, see Dorcas Wong, "China's new negative list targets unified market access," *China Briefing*, January 2019.

Countries with regional proximity, significant trade in resources, and cross-border capital flows are most exposed to China

We studied country-level exposure to Chinese imports (share of domestic production exported to China), exports (share of domestic consumption imported from China), and capital (inbound FDI from China as a share of domestic investment). Of the 73 economies we studied, 69 had increased their exposure to Chinese imports as a share of domestic production, 72 had increased their exposure to Chinese exports as a share of domestic consumption, and 58 had increased their exposure to Chinese capital as a share of domestic investment since 2007 (Exhibit E3).

16%

of gross Australian output imported by China today vs

4%

in 2003–07

— **Asian economies are tightly linked with China through regional supply chains.** Exposure of Asian countries to China, especially China as an export destination, has been growing. In many cases, these countries are tightly connected to China in global value chains, and trade with China accounts for a large portion of domestic production. For example, trade with China (including both imports and exports) amounts to almost 30 percent of Singaporean production. MGI has found that value chains are becoming more regional and less global; the intraregional share of global goods rose by 2.7 percentage points from 2013 to 2017.[1] This development is particularly noticeable in Asia. China is the largest trading partner for Malaysia, Singapore, and the Philippines, for instance. In some of these economies, Chinese capital is equally significant. Between 2013 and 2017, Chinese outbound FDI was equivalent to 6 percent of domestic investment in Malaysia and 5 percent in Singapore.

— **Resource-rich countries are highly exposed to Chinese demand.** Countries that export natural resources are highly exposed to Chinese demand. For example, Chinese imports now account for 15 percent of production in South Africa, compared with only 2 percent in the period from 2003 to 2007. Similarly, Chinese imports now account for 16 percent of gross output in Australia, compared with just 4 percent in the earlier period. Iron ore alone accounts for 48 percent of Australia's exports to China (minerals and metals in total represent 84 percent of exports), and 21 percent of Australia's mining and quarrying output is exported to China.

— **Some emerging and smaller mature economies are highly exposed to Chinese investment.** From 2013 to 2017, Chinese outbound FDI was equivalent to 13 percent of domestic investment in Egypt and 8 percent in Pakistan, for example. MGI research in 2017 found that China was not only Africa's largest trading partner, but also its largest source of finance for infrastructure and its third-largest source of foreign aid.[2] Significant shares of Chinese FDI have gone to the real estate, energy, and transportation infrastructure sectors.

— **In contrast, large developed economies have relatively lower exposure to China.** Given the sizes of their domestic economies, developed economies (especially those in Western Europe and North America) have relatively lower trade and investment exposure to China. Exports to China typically account for less than 5 percent of gross output, and imports from China account for less than 5 percent of domestic consumption. Furthermore, Chinese FDI was equivalent to less than 1 percent of domestic investment.

[1] *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.

[2] In many cases, exposure to Chinese capital is driven by the country's involvement in the Belt and Road Initiative (BRI), although we should note that Chinese investment in African economies predated the announcement of the initiative. For more on the China-Africa relationship, see *Dance of the lions and dragons: How are Africa and China engaging, and how will the partnership evolve?*, McKinsey & Company, June 2017.

Exhibit E3

Countries with regional proximity, significant trade in resources, and cross-border capital flows are the most exposed to China.

Exposure Least Most

Archetypes	Countries	Exports to China as a share of domestic production, %		Imports from China as a share of domestic consumption, %		Inbound FDI from China as a share of domestic investment, %	
		2003–07	2013–17	2003–07	2013–17	2003–07	2013–17
Regional proximity exposure	South Korea	8	11	4	6	<1	<1
	Malaysia	8	11	5	11	<1	6
	Philippines	12	8	6	14	6	<1
	Singapore	10	11	12	18	2	5
	Vietnam	3	11	6	13	3	1
Resource-related exposure	Australia	4	16	3	7	<1	3
	Chile	5	13	3	10	<1	<1
	Costa Rica	9	9	2	5	3	<1
	Ghana	<1	8	5	18	<1	4
	South Africa	2	15	2	6	<1	3
Capital exposure	Egypt	<1	<1	3	5	1	13
	Pakistan	<1	1	3	7	2	8
	Peru	4	7	1	5	2	6
	Portugal	<1	2	<1	3	<1	3
Developed economies	United States	<1	2	3	6	<1	<1
	Germany	2	4	2	3	<1	<1
	Japan	4	5	3	5	<1	<1
	United Kingdom	<1	2	2	5	<1	2

Source: IHS Markit; National Bureau of Statistics; McKinsey Global Institute analysis

Key sectors' exposure to China varies

We studied 20 primary industries and manufacturing sectors and the global exposure to Chinese consumption and production as well as Chinese imports and exports (Exhibit E4). We note that our analysis largely covers primary and manufacturing sectors rather than services sectors because primary and manufacturing sectors are more traded and because more data on them are available.

Almost all sectors are exposed to China, given the sheer size of its economy. China accounts for more than 20 percent of global consumption in 17 out of 20 categories in manufacturing, and China's share of services consumption has also increased.[1] This implies that companies looking for sources of growth may not be able to afford to overlook opportunities in China.

[1] *Globalization in transition: The future of trade and global value chains*, McKinsey Global Institute, January 2019.

Exhibit E4

Technology, labor-intensive tradables, and resource value chains are exposed to trade with China.

Archetype	Sector name	Trade intensity	Chinese share of global exports, %		Chinese share of global imports, %	
			2003–07	2013–17	2003–07	2013–17
High level of integration	Computer, electronic, and optical products		15	28	12	16
	Electrical equipment		16	27	7	9
	Other machinery and equipment		7	17	8	9
High exposure to Chinese exports	Textiles, apparel, and leather		26	40	5	5
	Furniture, safety, fire, other		17	26	2	4
	Other non-metallic mineral products		11	22	5	8
	Rubber and plastics		10	19	5	7
	Basic metals		8	13	8	8
High exposure to Chinese imports	Mining and quarrying		1	1	7	21
	Chemicals		4	9	9	12
	Paper and paper products		3	9	6	12
Global chains with little trade exposure to China	Other transport equipment		3	6	3	5
	Pharmaceuticals		2	4	1	3
	Motor vehicles and trailers		1	3	2	7
	Coke and refined petroleum products		2	4	4	6
Local production for local consumption	Food, beverages and tobacco		3	4	3	6
	Fabricated metal products		14	23	3	5
	Wood and wood products		11	22	2	3
	Printing and media		8	18	2	4
	Agriculture, forestry, and fishing		5	5	7	19

Source: IHS Markit; McKinsey Global Institute analysis

21%

of global mining and quarrying imports went to China in 2013–17 vs

7%

in 2003–07

In examining engagement through trade, five distinct types with varying degrees of exposure emerge from our analysis:

— **China is integrally embedded in the value chains of the electronics, machinery, and equipment sectors.** Sectors with a high level of integration across the board are exposed to China as both a supplier and a market. These sectors are highly traded in general. China's high level of integration in these sectors is reflected in its share of global trade. It accounts for 17 to 28 percent of global exports and for 9 to 16 percent of global imports. China's share of output in these sectors is also considerable, at 38 to 42 percent of the global total.

— **The world depends on Chinese output in highly tradable light manufacturing and labor-intensive sectors.** Sectors in which China has served as factory to the world are exposed to Chinese production. China's share of global production in light manufacturing can be as high as 52 percent (in the case of textiles and apparel). In many cases, global exposure to Chinese exports can also be high. For instance, China accounts for 40 percent of global exports in textiles and apparel, and 26 percent in furniture.

— **Upstream sectors have increased exposure to China as a result of China's industrialization.** Sectors that produce inputs for further processing are exposed to Chinese imports. The growth of China's manufacturing sector has significantly increased its demand for raw materials and intermediate goods that are processed into final goods, and growth in per capita income has increased demand for goods overall in China. China accounted for 7 percent of global mining and quarrying imports in 2003 to 2007, and its share grew to 21 percent by 2013 to 2017.

— **In other sectors that are highly traded globally, China is not a major player.** In sectors where companies focus on serving rapidly growing local demand and local content requirements are in place, trade exposure to China has remained relatively low despite high trade intensities. For example, China accounts for only 4 percent of global pharmaceuticals exports and 3 percent of global imports. Similarly, in motor vehicles, China accounts for only 3 percent of global exports and 7 percent of global imports, despite a relatively high trade intensity. However, given that China is a large market for these sectors, a local presence is important for companies wishing to serve that market.

— **Sectors that are not globally traded tend to have low exposure to China.** We classify five that have relatively low trade intensities, as a "local production for local consumption" archetype. Despite relatively low trade intensity, China accounts for a large share of trade in some of these sectors. For instance, it accounts for 23 percent of global exports of fabricated metals and for 18 percent of global imports of agricultural products.

China's technology value chains are globally integrated

14%

of revenue earned by US information technology sector is in China (MSCI Index)

China has made huge strides in innovation in recent years, becoming a global force in the world's digital economy and artificial intelligence (AI) technologies.[1] In many types of technology, it is already the largest consumer. For instance, China accounted for 40 percent of global mobile phone sales in 2017, 64 percent of battery electric vehicles (BEVs) sales, and 46 percent of semiconductor consumption. Access to the Chinese market has provided many high-tech players with significant growth opportunities. According to an MSCI index, the US information technology sector makes 14 percent of its revenue in China.

China's continued innovation is at the heart of its economic development in an era of spreading digital, automation, and AI technologies. Because technology value chains are some of the most complex, they require the most collaboration, and China is highly integrated in these value chains, with a large share of global exports and imports. Consider, for instance, that in the case of integrated circuits and optical devices, Chinese imports outstrip China's domestic production by a factor of five.

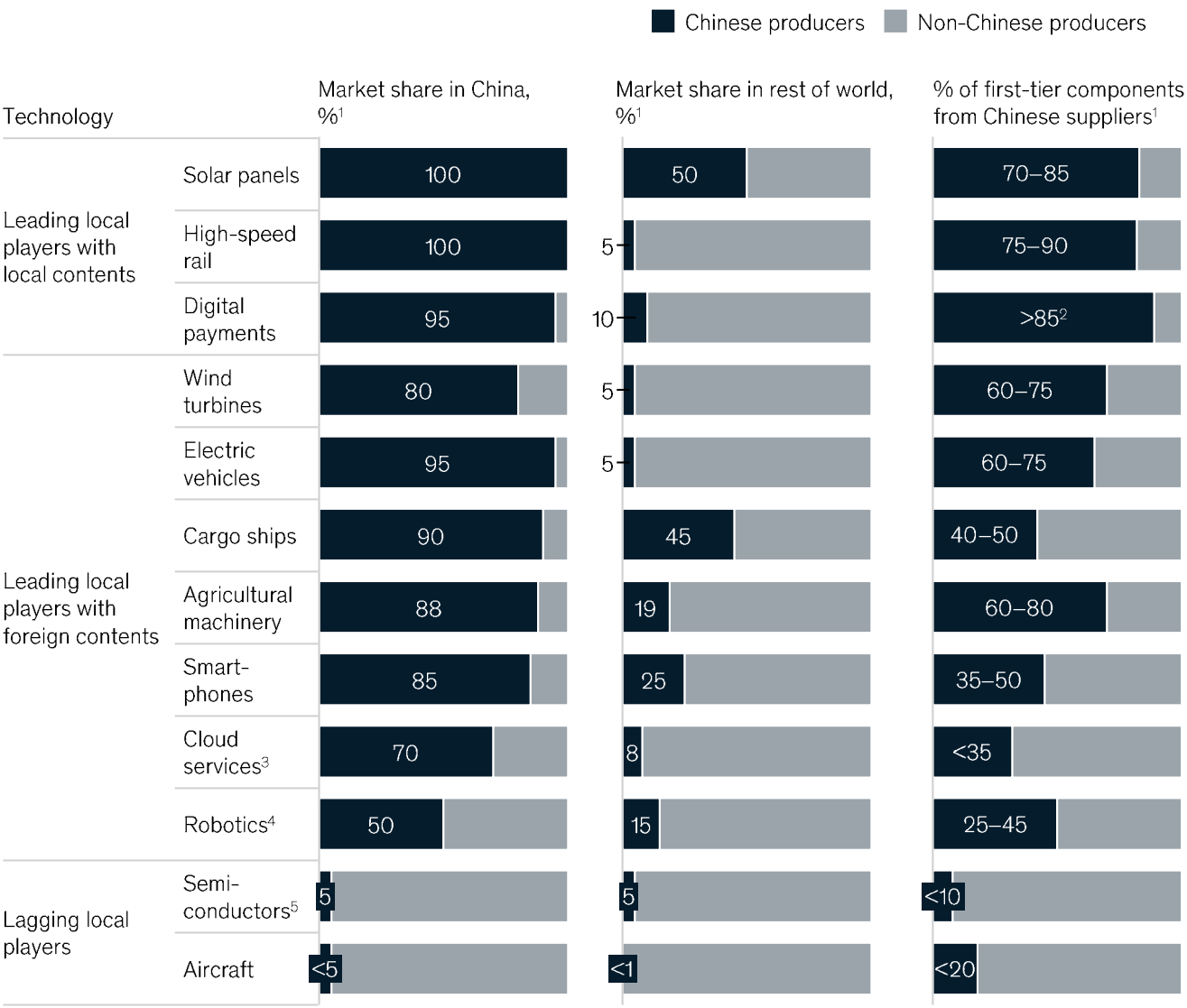
Technology is arguably at the center of the changing relationship between China and the world. Because China is highly exposed to foreign technology flows, it needs continued—if not enhanced—access to technologies to fuel its innovation and enhance productivity. The rest of the world, notably the advanced economies, pays increasing attention to China's rapid technological development. New legislation more closely evaluates Chinese investment that grants access to foreign technology. Close attention has been paid to whether China's technology value chains are becoming decoupled from global value chains, and to China's stated aims to localize technology sectors.[2] China's Made in China 2025 plan sets targets for local players' market share of 40 to 90 percent in 11 of 23 subsectors prioritized by the government.[3]

China has been localizing value chains in different sectors. Rising demand and the development of domestic value chains in China also partly explain the recent decline in trade intensity at the global level. A larger share of output is being consumed domestically in China.[4] In many respects, China's technology markets already appear to be localized, but the degree varies. In the case of solar panels, high-speed rail, digital-payment systems, and electric vehicles (EVs), Chinese players account for more than 90 percent of the domestic market. In other segments including semiconductors and aircraft manufacturing, Chinese players have a very small market share both at home and internationally, and they depend heavily on foreign technology. In the majority of value chains we studied, China has huge room to expand its global presence. At the high end, China has up to 50 percent of the rest-of-world market in solar panels; at the low end, its aircraft manufacturing market share abroad is less than 1 percent (Exhibit E5).

1 *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017; *Artificial intelligence: Implications for China,* McKinsey Global Institute, April 2017; and *Notes from the AI frontier: Modeling the impact of AI on the world economy,* McKinsey Global Institute, September 2018.
2 *Made in China 2025 and the future of American industry,* Project for Strong Labor Markets and National Development, US Senate Committee on Small Business & Entrepreneurship, February 2019.
3 *Made in China 2025 key area technology innovation green book,* National Manufacturing Power Building Strategy Advisory Committee, October 2015.
4 *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.

Exhibit E5

Chinese technology producers have gained market share in key subsegments but still rely on global value chains for inputs.



1 Based on 2018 or the latest available data.
2 Compares local vs imported software development costs.
3 Servers used for cloud storage purposes.
4 Captures only industrial robots.
5 China and rest-of-world market shares assumed to be equal due to data availability.

Source: Annual reports; literature search; McKinsey Global Institute analysis

60–80%

of inputs to technologies studied come from Chinese suppliers

To gauge China's integration with the world in technology value chains, MGI studied 81 technologies in 11 areas and found that China uses global standards for more than 90 percent of them (Exhibit E6). In the minority of sectors where China's standards have diverged from global ones, economic drivers can explain the shift. For example, in polyvinyl chloride (PVC) manufacturing, the costs associated with adopting a coal-based process versus an ethylene-based process that is more common outside China are lower because China has an abundance of coal. Our analysis finds that China's local producers are able to provide 60 to 80 percent of the technologies studied, which means that China still uses inputs from multinational corporations in at least 20 to 40 percent of cases. Finally, an analysis of comparable standards found that Chinese suppliers may be able to achieve performance on a par with, or better than, global suppliers in 40 to 60 percent of the technologies studied. In some emerging technologies (for instance, 5G, AI, and quantum computing) where a global standard may not yet have been defined, China has begun to make headway. Nevertheless, even in the case of these technologies China has benefited from, and continues to use, foreign equipment, talent, and investment.

Experience around the world suggests that four elements need to be in place to move up the technology value chain: (1) investment at scale; (2) channels through which to acquire technology and know-how; (3) access to large markets; and (4) an effective system to encourage competition and innovation. Historical cases of technological progress in Japan (automotive), South Korea (semiconductors), and China (high-speed rail and LCD) suggest that all four elements have played critical roles in technology development and innovation. In Chinese high-speed rail, for instance, the sector has benefited from continued state-led investment that has supported the construction of 20,000 kilometers of railroad since 2004. China arranged technology transfer agreements with four leading high-speed rail incumbents. China is the world's largest market for high-speed rail with 65 percent of global mileage. Given that it was a national priority, business executives and engineers understood the urgency and effectively mobilized resources to "digest and innovate" in order to develop solutions for the Chinese environment and deploy at scale.[1]

Looking at the four elements in China's technological sectors, we find that China has substantial scale in investment (the first element) and markets (the third element). It has capacity to support a great deal of investment in technological R&D and to create new markets to commercialize the technologies.[2] Therefore, the critical ways for China to move up the value chain are to make progress on developing and acquiring core technology and know-how (the second element), and designing an effective system to ensure that its ecosystem has the competitive dynamics to fuel innovation (the fourth element). In both cases, participation in global value chains and stronger flows of capital, knowledge, and talent could accelerate China's move up the value chain.

1 *The China effect on global innovation,* McKinsey Global Institute, October 2015.
2 *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017.

Exhibit E6

China has integrated with global standards for most technologies and is showing different technology localization across value chains.

	Areas/sectors	Techno-logies reviewed	Share using global standard[1]	Share that has local provider[1]	Share where Chinese companies technically provide better than or on par with global leader[1]
Basic materials	• Mining • Steel	7			
Chemicals	• Oil and gas • Commodity and specialty chemicals • Textiles	12			
Components	• Display • Integrated circuits	8			
Electric vehicles	• Battery electric vehicles • PHEVs	7			
Transportation	• High-speed rail • Marines	10			
Consumer electronics and internet	• Consumer electronics • Digital payments • Drones	11			
Equipment	• Surgical robots • Industrial robots	4			
Pharmaceuticals and biotech	• Small-molecule drugs • Biomolecule drugs	6			
Artificial intelligence	• Speech recognition • Facial recognition • Autonomous driving	5			
Next-generation technologies	• Quantum technology • 5G • Space	8			
Genomics	• Genotyping • Gene sequencing • Gene editing	3			
Total		81	>90%	60–80%	40–60%

[1] We estimated "share using global standard" by identifying key technologies in different areas and assessing whether China utilizes the same technical standards and processes that are most commonly used outside China. We assessed "share that has local supplier" by analyzing whether Chinese companies have a presence among global suppliers for each key technology. We analyzed the "share that is better than it on par" by defining specific performance indicators and whether local Chinese suppliers are able to deliver technical outcomes that are better, or on par with, incumbents outside China.

Source: Literature search; expert interviews; McKinsey Global Institute analysis

>90%

annual growth in China's EV market 2011–17

We looked at three value chains to explore where China stands and evaluate the impact of a more integrated technology chain for both China and the world:

— **EVs: China has developed a significant domestic industry and shows signs of integrating more globally.** China's EV market posted annual growth of more than 90 percent between 2011 and 2017, driven by major investment and government support. However, candidates for government subsidies were restricted to locally produced vehicles.[1] In 2017, Chinese original equipment manufacturers (OEMs) commanded more than 90 percent of the domestic market but less than 5 percent of the market in the rest of the world. Despite the large share of domestic OEMs, China has benefited from integration with global value chains. In the case of power electronics and electrical circuits, China imports a huge majority from Europe, Japan, and the United States. In quality, Chinese manufacturers lag behind others in some areas. For instance, leading Chinese batteries have 30 to 40 percent lower density than leading Japanese batteries.[2] China has announced plans to raise the competitiveness of the local EV industry, with subsidies expected to end by 2020 and restrictions on joint ventures being relaxed, opening up new opportunities for multinational corporations.

— **Robotics: Local producers have gained competitiveness in some subsectors, but China has used integration in global value chains to access core components and high-end solutions.** China is the largest robotics market in the world, accounting for 36 percent of total industrial robot unit sales. Overall, foreign players account for more than 50 percent share of the domestic market, although Chinese companies are making progress especially in small-scale, low-complexity applications. Chinese OEMs now have a more than 50 percent share in dispensing, palletizing plastic molding, and metal casting robots, but only about 10 percent of robots for welding and material handling, for instance. China continues to rely on foreign production in China, or foreign imports to China, of leading-edge technology in core components such as servo motors, reduction gears, and control systems.

— **Semiconductors: China still largely depends on integration in global technology value chains.** This has been a strategic industry for China, receiving substantial government attention and investment. Nevertheless, the domestic industry has made only moderate advances. China imported more integrated circuits in 2018 than crude oil. China's presence in integrated device manufacturing and equipment is minimal, but it has made some progress in fabless, increasing global market share from 11 percent in 2013 to 15 percent in 2017. The government has announced a plan to expand domestic supply for semiconductors (including from foreign players in China) to 80 percent of domestic demand by 2030 from 33 percent in 2016. Integration with global value chains can accelerate that journey. Abiding by global standards could open more access to global technology know-how and facilitate needed capital, knowledge, and talent inflows. More integration could also create healthy competition for local players, especially for state-owned enterprises (SOEs). For the rest of the world, the advantages of integration include access to the largest consumer of semiconductors in the world. There could be opportunities for new collaborations in innovative areas. For instance, as silicon-based semiconductor chips are nearing the theoretical limit proposed by Moore's Law, new materials such as graphene and gallium nitride, and ways of designing including 3D and photonics, offer new opportunities for global partnerships.

1 *Supercharging the development of electric vehicles in China,* McKinsey & Company, April 2015. Locally produced products typically include output from joint venture companies.
2 "Will Ningde era be surpassed by LG Chem? The world's top battery oligos divide 80% of market," *Battery China,* December 11, 2018, http://www.cheyun.com/content/25122.

25%

of Chinese urban household spending on food in 2017 vs

50%

in 2000

China's rapidly expanding consumption offers significant further opportunities to both domestic and foreign players

China's rapidly expanding consumer market—confident, becoming richer, increasingly sophisticated, and willing to experiment—offers a strong link between China and the world. It is not only the prime engine for economic growth but a huge opportunity for international businesses. By 2030, 58 percent of Chinese households are likely to be in the "mass affluent" category or above, surpassing today's South Korean share of 55 percent.[1] The spending profile of urban Chinese consumers is converging with that of their counterparts in cities around the world. Chinese urban consumers are devoting a greater share of their income to discretionary spending. Spending on food declined from 50 percent of total household consumption in 2000 to 25 percent in 2017. This is already similar to urban consumers in developed countries today—Japan at 26 percent, South Korea at 29 percent, and the United States at 17 percent.

Multinational corporations in China face a changing competitive landscape

China's consumer markets are already heavily integrated with the world. Since it joined the WTO in 2001, China has gradually reduced barriers for foreign firms operating in China, and in 2004 it began to allow foreign investors to operate retailers across all parts of its domestic market. It also opened up distribution, allowing foreign distribution companies to apply for national licenses.[2] As a result, multinational corporation penetration in China is considerable. Our analysis of top 30 brands across the ten large consumer categories suggests that foreign multinational corporations' average penetration in China was 40 percent in 2017, compared with just 26 percent in the United States. In some categories, penetration is even higher; for instance, in beauty and personal care, multinational corporation penetration is as high as 73 percent (Exhibit E7).

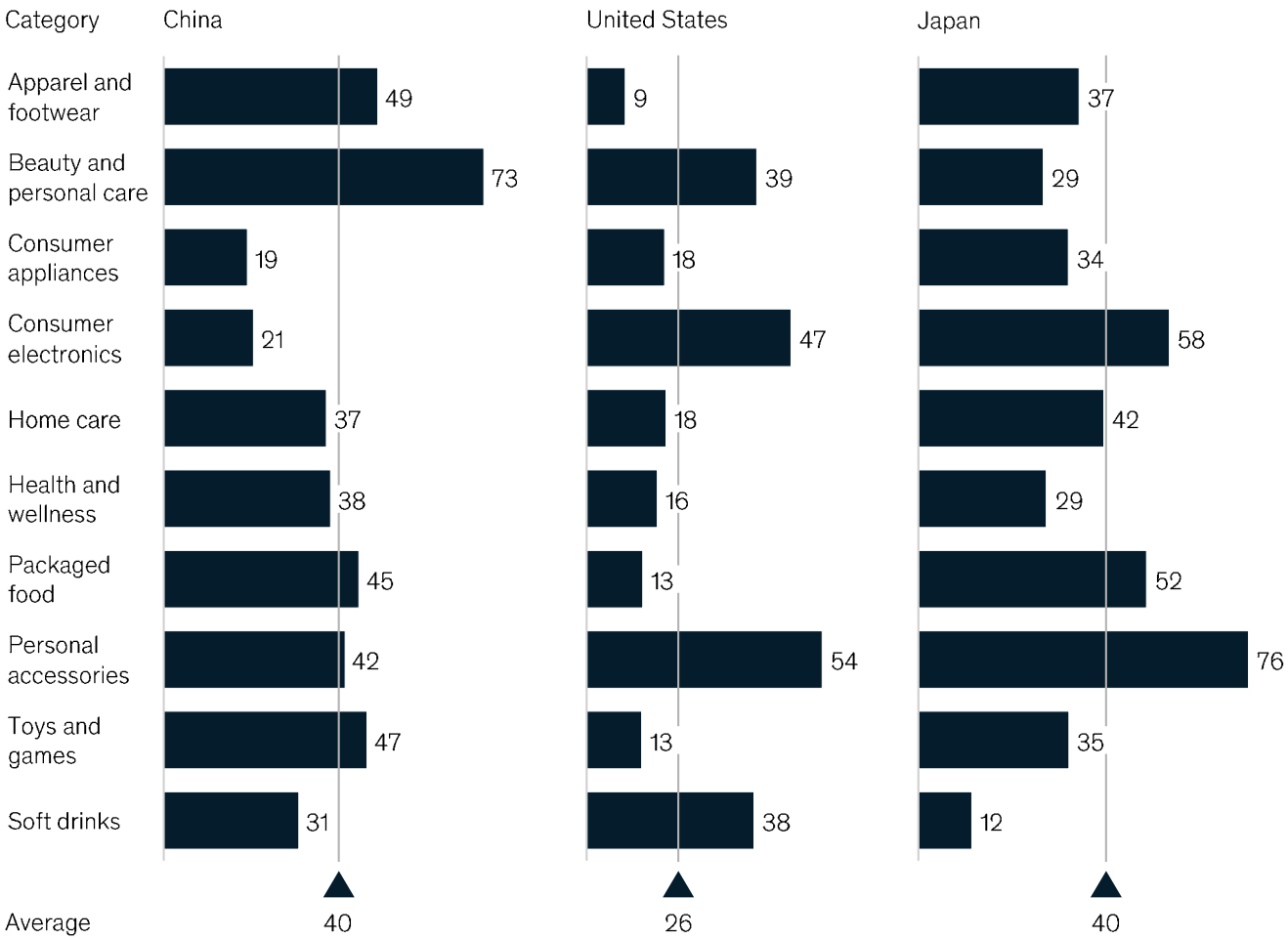
1 Defined as a household with disposable household income of 18,000 renminbi or more per month.
2 Christina Nelson, "Developing China sales and distribution capabilities," *China Business Review,* July 1, 2010.

Exhibit E7

Multinational corporation penetration in China is higher than in the United States.

Foreign multinational corporation market share of top 30 brands by category and market, 2017

%



Note: Figures may not sum to 100% because of rounding.

Source: Euromonitor; McKinsey Global Institute analysis

>30%

of smartphones in Africa are Chinese

As more multinational corporations have entered the Chinese market, they have catalyzed the development of homegrown companies and brands. In our study of 30 categories of consumer goods, foreign brands have lost share in 11 categories. In those categories, Chinese players have upgraded products to match the quality and performance of those offered by foreign companies. In some cases, Chinese players are beginning to go global. US and South Korean manufacturers once had strong positions in the smartphone market (especially in the premium segment), but Chinese brands' products are now being exported to countries in Southeast Asia, Africa, and Europe. Chinese smartphones have market shares of more than 30 percent on the African continent and in India and Malaysia, according to IDC data. In mobile gaming, which grew by 250 percent from 2016 to 2018, Chinese titles such as Arena of Valor and Rules of Survival are now being exported.

Two trends offer significant business opportunities for both domestic and foreign players

We highlight two trends that offer significant business opportunities for both domestic and foreign players:

— **Chinese consumers demand more and better choices in goods and services.** As incomes rise, consumers want more choice, and, despite discussion about a consumption downgrade, we find evidence of a broad trend of trading up. McKinsey's 2018 Global Consumer Sentiment Survey showed that 26 percent of Chinese respondents were trading up overall, compared with 17 percent in ten other top economies. In some cases, Chinese consumers are not satisfied with domestic brands partly because of perceived quality issues and a lack of choice—attitudes observed in both goods and services. A fast-growing channel for Chinese consumers to access goods from overseas is cross-border e-commerce. From 2015 to 2017, cross-border e-commerce retail imports in China almost doubled to 111 billion renminbi ($17 billion) according to iResearch data. Services are the next area in which we expect to see competition leading to higher quality. Chinese services sectors still lag behind those in other countries, with productivity of only 20 to 50 percent of the OECD average. In healthcare and education, some higher-income citizens have explored and used foreign provision because of perceived quality and capacity issues domestically. Although the government has put in place initiatives to open up services to foreign players, their participation remains limited.

— **A rising number of Chinese people go abroad and spend more.** China's increasing flows of people—particularly students and tourists—represent an expanding business opportunity for businesses in destination countries. China is already the largest source of outbound tourists in the world. Their spending is equivalent to 7 to 9 percent of domestic private consumption in Singapore and Thailand, respectively. China's outbound students can have a significant impact on other economies, too. Australian education exports to China amounted to 10 billion Australian dollars in 2017 (not including additional spending of Chinese students for day-to-day living). Companies can take advantage of these trends by adapting to Chinese tastes and tailoring offerings.

Significant potential value could be at stake from less and more engagement between China and the world

China and the rest of the world appear to be reevaluating their relationship. In the rest of the world, particularly in advanced economies, the unintended consequences of globalization and unequal distribution of benefits are a topic of discussion, and in the United States, there are concerns about the "China shock" displacing manufacturing jobs.[1] Several major economies are putting in place legislation making foreign investment deals—particularly where technology deemed strategically important is involved—subject to stricter review. These developments could presage lessening engagement between China and the world. However, disengagement is not inevitable.

We highlight five choices for China and the world that could lead to more or less engagement, and we simulated the potential economic value that could be created or lost depending on these choices. The five areas where China could be more—or less—engaged are: (1) growth as an import destination; (2) liberalization of services; (3) globalization of financial markets; (4) collaboration on global public goods; and (5) flows of technology and innovation.

The results of our simulation, which uses McKinsey's Global Growth Model and calibrates its findings with external research, suggest that deeper engagement in these five areas could potentially create significant value for China and the world, and that less engagement could put a large amount of economic value at risk by 2040. A huge majority of this value is in the form of impact on GDP, with the remainder in other types of value such as higher or lower social costs depending on choices associated with tackling climate change. The total value at stake could be $22 trillion to $37 trillion by 2040, equivalent to about 15 to 26 percent of global GDP (Exhibit E8).

In scenarios of both more and less engagement, there will be upsides and downsides for different stakeholders. For example, less engagement between China and the world could benefit countries in Southeast Asia through greater demand for their exports. Conversely, more engagement between China and the world could create short-term shocks for Chinese workers and firms in certain sectors as the country imports more from the rest of the world. We note that our estimates of the value at stake are the result of a simulation based on a specific set of conditions and assumptions, and they should not be taken as forecasts.[2] For example, for the scenarios, we have made assumptions on how various factors could affect the total factor productivity of the economy. Our analysis is sensitive to the degree of liberalization that would occur in the Chinese services sector, increases in capital productivity as a result of greater financial globalization, and productivity improvements from technology exchange. There are several factors that we have excluded from this simulation including risks associated with political agenda and military interventions. The simulation focuses on long-term impact. We are not attempting to predict the outcome of current debates on trade and tariffs.

[1] See, for instance, Daron Acemoglu and Pascual Restrepo, *Robots and jobs: Evidence from US labor markets,* July 16, 2018; Daron Acemoglu et al., "Import competition and the great U.S. employment sag of the 2000s," *Journal of Labor Economics,* 2016, Volume 34, Number 1; and David H. Autor, David Dorn, and Gordon H. Hanson, "The China shock: Learning from labor market adjustment to large changes in trade," *Annual Review of Economics,* 2016, Volume 8.

[2] Our simulation was built by synthesizing insights from more than 30 academic papers and by combining the modeled effects of key economic indicators in McKinsey Global Institute's Global Growth Model and external models. For more information on our methodology, please refer to the technical appendix.

~$6

trillion growth in Chinese consumption expected in period to 2030, comparable with the United States and Western Europe combined

— **China could develop itself as a major destination for imports from emerging and advanced economies; with less engagement, global trade flows could contract.** According to consensus forecasts, growth in Chinese consumption in the period to 2030 is likely to be about $6 trillion, comparable with that of the United States and Western Europe combined, and double that of India and the Association of Southeast Asian Nations (ASEAN) combined. By importing more—and higher-quality—goods, China could meet the rising expectations of middle-class consumers and stimulate more domestic consumption. The world would also benefit. As China moves into higher-value-added industries, it can import more labor-intensive goods from emerging economies and high-quality goods from advanced economies, helping to create more employment in other economies. However, with less global engagement, continued trade disputes may lead to higher long-term tariffs, a contraction in global trade volumes, and lost productivity. Consumer goods prices in developed markets could increase. In China, contraction in trade could lead to oversupply of manufacturing employment. Our simulation indicates that the value at stake related to trade could be $3 trillion to $6 trillion.

Chinese service sector labor productivity only

20–50%

of OECD average

— **China and foreign players could benefit from liberalization of services; if services remained restricted, China would continue to operate at a productivity gap with developed economies.** Services are a growing part of China's economy, accounting for 52 percent of GDP in 2018, compared with 44 percent in 2010. Yet quality, capacity, and access issues affect many service subsectors, and many restrictions on foreign players may be holding back competition, modernization, and therefore higher productivity. Labor productivity in Chinese services sectors can be 20 to 50 percent that of the OECD average. A range of recent government initiatives signals greater openness, although a range of operational barriers to foreign players may remain. Our simulation suggests that $3 trillion to $5 trillion could be at stake from more or less global engagement in Chinese services.[1]

— **Further globalizing and modernizing China's financial system could broaden choice and allocate capital more efficiently; choosing not to do so could risk more volatility and low productivity growth.** China's relatively closed financial system means that consumers have limited options for asset allocation, fueling a real estate price increase and depressing returns. SOEs account for about 70 percent of corporate debt but generate only slightly over 20 percent of industrial output.[2] A more globally integrated financial system would give Chinese consumers, businesses, and investors more choice and would improve resource allocation. Conversely, less global engagement could lead to higher levels of risk in the financial system (from nonperforming loans, for example), which could raise the cost of capital as the spread between commercial interest rates and risk-free rates potentially widens.[3] Overall, $5 trillion to $8 trillion of value could be at stake according to our simulation.

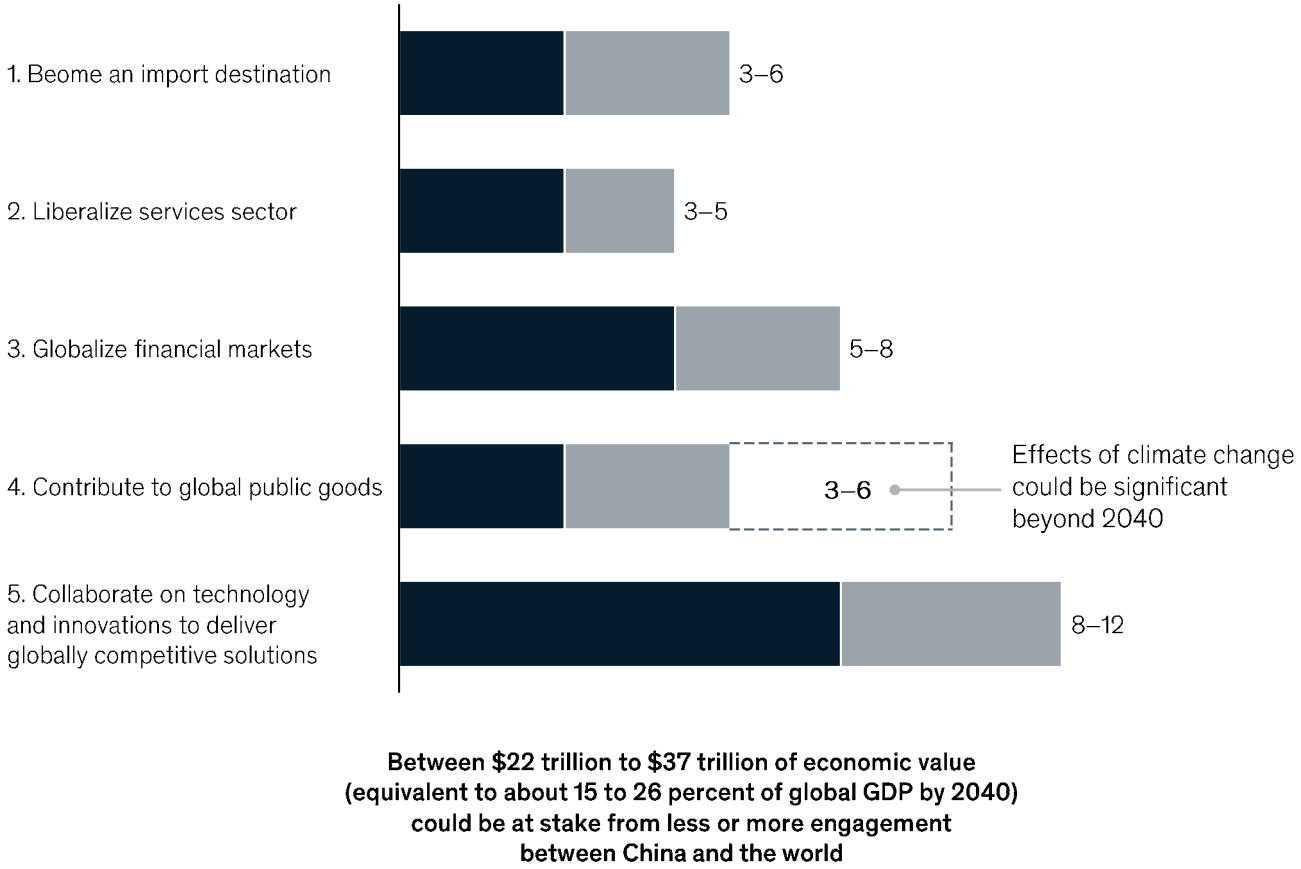
1 For more details on the impact of services-sector liberalization, see Denise Eby Konan and Keith E. Maskus, *Quantifying the impact of services liberalization in a developing country,* policy research working paper WPS3193, World Bank, 2004; Aaditya Mattoo, Randeep Rathindran, and Arvind Subramanian, *Measuring services trade liberalization and its impact on economic growth: An illustration (English),* policy research working paper WPS2655, World Bank, 2001; Oleksandr Shepotylo and Volodymyr Vakhitov, *Impact of services liberalization on productivity of manufacturing firms: Evidence from Ukrainian firm-level data,* discussion paper number 45, Kyiv School of Economics, 2011.

2 Lingling Wei, "As China faces slowdown. Stimulus will have smaller global reach," *Wall Street Journal,* March 16, 2019. One IMF study estimates that removing Chinese zombie companies, reducing overcapacity, and reforming inefficient SOEs could increase total output by 0.7 to 1.2 percentage points. See W. Raphael Lam et al., *Resolving China's zombies: Tackling debt and raising productivity,* International Monetary Fund, November 27, 2017.

3 Christopher Balding, "Rising interest rates challenge China's growth," Bloomberg Opinion, August 15, 2018.

Exhibit E8

The value at stake from more and less engagement between China and the world is significant.


1. Beome an import destination
3–6
2. Liberalize services sector
3–5
3. Globalize financial markets
5–8
4. Contribute to global public goods
3–6
Effects of climate change could be significant beyond 2040
5. Collaborate on technology and innovations to deliver globally competitive solutions
8–12
Between $22 trillion to $37 trillion of economic value (equivalent to about 15 to 26 percent of global GDP by 2040) could be at stake from less or more engagement between China and the world

Note: Our estimates of the value at stake are the result of a simulation based on a specific set of conditions and assumptions; they should not be taken as forecasts. We used McKinsey's Global Growth Model as the basis for simulation and modeled potential upsides and downsides depending on how more- or less-engagement scenarios affect key economic drivers. The simulation focuses on the long-term economic impact and is not an attempt to predict the outcome of current debates on trade and tariffs.

Source: McKinsey Global Institute analysis

— **China could increase its contribution to solving global challenges; in a scenario of less engagement, leadership and collaboration would be weaker.** The rules underpinning the global economic system are in flux, and China can contribute to addressing global issues. It is already increasing its commitment to (and financing of) international institutions and its support of new ones representing emerging economies, such as the Asian Infrastructure Investment Bank and the New Development Bank, in which China holds 30 and 20 percent stakes, respectively. It is also forming regional trade blocs and emerging as a key player in the development of solutions to global issues—in the case of climate change, through its development of renewable energy and clean coal solutions. China could nonetheless potentially do more to innovate and export solutions to the world, for instance helping to define global digital governance, and to fill the world's estimated $350 billion annual infrastructure investment gap.[1] We estimate that $3 trillion to $6 trillion could be at stake from more or less global engagement with China and as a result broader international collaboration on topics related to global public goods such as the environment and cyberspace.

— **Global flows of technology between China and the world could increase, supporting the development of globally competitive, productivity-enhancing solutions; alternatively, reduced technology flows could undermine global productivity.** One of the largest drivers of China's recent economic growth has been innovation—both home-grown and imported—that has enabled the economy to move up the value chain. Greater technology flows require a mutually acceptable system of IP protection. Global engagement on this issue, and a transparent and reliable process for resolving IP issues, could increase the revenue of foreign firms selling technology to China and reduce IP leakage. One study estimated large costs incurred by US firms.[2] For China, greater integration could broaden access to needed foreign technology and enable collaboration with foreign investors, institutions, and talent to codevelop leading solutions. However, if current trade tensions were to lead to higher long-term tariffs and substantial restriction of technology flows, innovation could be hampered and productivity growth could decline significantly. For the rest of the world, less engagement with China would undermine access to a key supplier and market for technologies, as well as a growing innovator that can export domestic solutions abroad. China became the first nation to land a spacecraft on the far side of the moon in early 2019, and it is codeveloping satellites with emerging economies such as Egypt. With less engagement, China could also lose access to critical technologies that it needs to fuel its economy. According to our simulation, $8 trillion to $12 trillion could be at stake, depending on how technology flows scenarios unfold and the subsequent impact on productivity growth.

We note that these choices and scenarios—and the resulting outcomes—are not China's alone but also dependent on the actions and reactions of the rest of the world. Reforming the global trading system to make it more effective at resolving disputes and more inclusive so that benefits from any further opening up of its economy by China can be captured and shared broadly is a collective task.[3] If and when China globalizes its financial sector, the rest of the world would need to be more open to Chinese investment. On tackling climate change, all countries need to commit to specific goals and milestones to avoid a situation in which some countries pursue self-interest to the detriment of the world as a whole. The magnitude of technology and IP flows between China and the rest of the world is subject to the stance taken by each country involved in these flows on technology-related investment and national security.

1 *Bridging global infrastructure gaps,* McKinsey Global Institute and McKinsey's Capital Projects and Infrastructure Practice, June 2016.

2 *The theft of American intellectual property: Reassessment of the challenge and United States policy,* Update to the IP Commission Report, 2017, /ipcommission.org/report/IP_Commission_Report_Update_2017.pdf.

3 Wendy Cutler, *Global trade is broken. Here are five ways to rebuild it,* World Economic Forum, September 12, 2018; and *Current trade challenges and opportunities,* OECD, https://www.oecd.org/trade/understanding-the-global-trading-system/trade-challenges-and-opportunities/.

Businesses may need to adjust their approach to thrive in the face of a more uncertain relationship between China and the world

Given the uncertainty and potential risk of the changing relationship between China and the world, businesses may need to adjust their strategies. There are four areas for consideration:

— **Assess short- and long-term exposure to the China-world relationship.** To understand the likely impact of changing relations between China and the world, companies should first assess their level of exposure to the China-world relationship. Exposure can take many forms. Our eight dimensions of the China-world relationship employ specific metrics that businesses could examine and track. Depending on their exposure, companies can assess risks and benefits depending on different engagement scenarios. Even in the face of short-term volatility and uncertainty, companies should also incorporate a view on China's long-term fundamentals. What long-term trends—including rising incomes, technology flows, and intensifying local competition—may have an impact?

— **Determine investment and value chain posture.** Given the scenarios and value at stake for every company, executives should determine their China strategy in terms of measures such as investment commitment compared with other countries, and the role that China should play in the company's global value chains. They should define and be clear about their aspirations for China—for instance, do they want to make China their key growth engine, or do they want to play only in niche areas? They could, for example, optimize investment as part of a long-term strategy, potentially investing more and doubling down on core value creation activities by, for instance, driving innovation and R&D, if China remains an important source of growth and innovation. If not, shifting business activities and investment to other geographies could also be considered.

— **Develop operational excellence needed to manage risks and uncertainty.** Given increased regulatory and economic uncertainty, companies need to be much more agile in delivering their value proposition. Governments around the world are playing an increasingly important role in cross-border investment, M&A, and flows of technology and people. Businesses should address the local context in which they are operating, because it can change quickly, sensitivities can grow, and operational mistakes can quickly escalate, drawing the attention of stakeholders. They may think about adjusting their operational footprint, which requires agility, and they need to devote more resources to risk management.

— **Adopt and maintain a survivor's mind-set.** Companies that have thrived despite recessions and crises in the past have tended to maintain a healthy balance sheet, take care to ensure access to finance, and have a broad range of businesses to insulate them from downturns in particular sectors. However, crises and uncertainty also bring opportunity; the pressure that accompanies them can be a catalyst to reorganization that improves the long-term health of a company, and new opportunities may emerge to expand footprints or market positions through business development and inorganic growth.

• • •

China is now the world's second-largest economy and a global trading powerhouse, but it has scope to extend its global integration further. The relationship between China and the world is changing. Given China's shift toward growth largely driven by domestic consumption while the world is reevaluating its relationship with China, could a measure of disengagement be emerging? If China and the world were to diminish their engagement with each other, both could lose significant value. Conversely, further deepening of their integration could produce large benefits. Whichever way the future relationship unfolds, businesses exposed to China's economy need to position themselves to thrive in what appears likely to be an uncertain period ahead.

1 How globally integrated is China?

Since China opted to open its economy to the rest of the world and engaged in widespread reform, it has become a true global power in scale. It became the world's largest trading nation in goods in 2013. By 2014, it had overtaken the United States to become the world's largest economy in purchasing-power-parity (PPP) terms. China is in the world's top two for receiving and being the source of FDI. It has 111 Fortune 500 companies, comparable with the US total. However, not all dimensions of China's scale have translated into global integration. Chinese firms still earn a significant majority of their revenue at home. Operational and regulatory complexities in China's financial markets remain a barrier to international players. Cross-border data flows tend to be limited despite the massive amount of data being generated in China's digital ecosystem.

~16%

Chinese share of global GDP in 2018 vs

2%

in 1990

In this chapter, we look at eight dimensions of China's global presence in scale and integration, putting its position in the context of the rest of the world by benchmarking it against other economies.

China has become a global power in scale, with varying degrees of global integration on eight dimensions

China has rapidly increased its share of global GDP since the economy began opening up and reforming in 1978, introducing the market economy to unleash an entrepreneurial spirit and empower the private sector, modernizing industries and technologies, and inviting foreign investment and trade. As the impact of economic reforms kicked in around 1990, China's share of global GDP doubled from 2 to 4 percent in a decade. From 2000 to 2010, the share doubled again to 8 percent, and by 2018, China already accounted for about 16 percent of world GDP. It overtook the United States to become the world's largest economy in purchasing-power-parity terms in 2014, according to International Monetary Fund (IMF) data—for the first time since 1870.[1] In nominal terms, China's GDP was 66 percent that of the United States in 2018, making it the second-largest economy in the world. The country has significant scope to continue its impressive run of GDP growth (see Box 1, "China has powerful growth momentum").

[1] *World Economic Outlook data: October 2016 edition,* International Monetary Fund, 2018; and Angus Maddison, *The world economy: Historical statistics,* OECD Development Centre, 2004.

Box 1

China has powerful growth momentum

The Chinese economy can benefit in the future from powerful domestic growth drivers, including urbanization, and it has significant scope to boost per capita GDP and productivity.

Comparison with Japan as it stood in the 1990s—when it was the world's second-largest economy, behind the United States—is instructive (Exhibit 1). At that point, Japan's per capita GDP was already about 50 percent above that of the United States (and about 20 percent lower on a purchasing-power-parity basis); China's nominal per capita GDP remains only about 15 percent of the US level (28 percent on a purchasing-power-parity basis). Japan's urbanization rate was already 78 percent; China's today is 58 percent, 20 to 30 percentage points below that of high-income economies.

Since the mid-1990s, Japan has struggled to achieve significant growth momentum. China is different. It has a large population, and incomes are relatively low in comparison with those in Japan and other advanced economies. Urbanization and continuing reform of the economy can boost productivity and enable further growth in incomes and GDP.

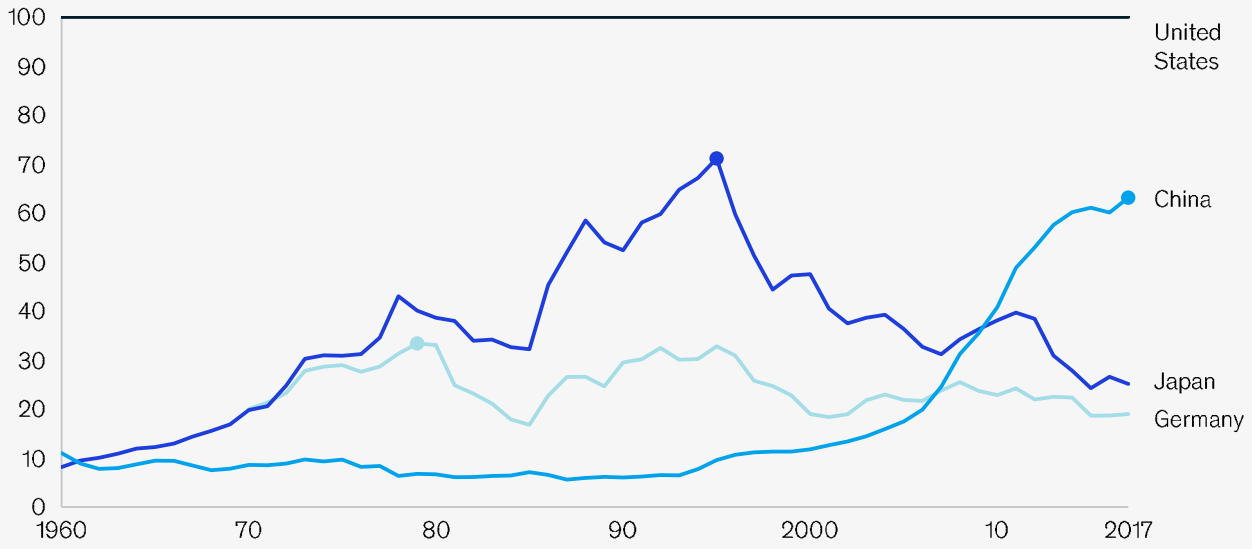
To achieve these milestones, China must meet a number of challenges. In 2016 research, MGI found that the investment-led model that had served China so well was running out of vigor, and capital productivity and corporate returns were falling. Debt rose from about 140 percent of GDP in 2007 to 250 percent in 2018. Given that the working-age population peaked in 2013, the onus is on China to boost productivity to drive further growth. The 2016 research found that shifting to a productivity-led growth model could generate very significant additional GDP and household incomes compared with what would be possible with an investment-led growth model.[1]

[1] *China's choice: Capturing the $5 trillion productivity opportunity,* McKinsey Global Institute, June 2016.

Exhibit 1

In contrast to Japan in the 1990s, incomes and the urbanization rate in China are relatively low, suggesting significant scope for further GDP growth.

Country GDP evolution, 1960–2017,
Index: 100 = United States, 1960 (current $)



	Germany 1979	Japan 1995	China 2017
Per capita GDP, % of United States	96	151	15
Urbanization rate, %	73	78	58

Source: World Bank; McKinsey Global Institute analysis

On the back of years of rapid economic growth, China has become a prominent actor in the global economy. We examined eight dimensions of China's globalization and found that while China has reached significant scale on all eight, this has not always translated into global integration (Exhibit 2).

Exhibit 2

China has achieved global scale, but more can be done.

	China's scale	More room to globalize further
Trade	China has been the world's largest goods trading nation since 2013, accounting for 11.4% of global goods trade in 2017	… but China accounted for only about 6.4% of global services sector trade in 2017
Firms	China has 111 Global Fortune 500 companies, comparable with the United States	… but those companies are still anchored in the domestic market (18% of revenue earned overseas vs 44% for S&P 500 firms)
Capital	China has a large financial system (the largest banking system, and second- and third-largest stock and bond markets, respectively)	… but cross-border flows (3–4x smaller than US flows) and foreign participation are limited (foreign ownership is less than 6% in banking, stock, and bond markets)
People	China is the world's largest source of outbound students (17% of international tertiary degree students in 2017) and tourists (Chinese tourists made 150 million outbound trips in 2018, the most in the world)	… but people flows are still geographically concentrated (~60% of outbound students go to the United States, Australia, and the United Kingdom), and migrant flows to China are only 0.2% of global total
Technology	China has invested heavily in its R&D (the world's second-largest spender with $293 billion in 2018)	… but still relies heavily on imported technology (more than half of technology import contracts come from just three countries) and intellectual property (China's IP imports are six times larger than exports)
Data	China has the most internet users in the world (more than 800 million), generating huge amounts of data	… but cross-border data flows are limited (8th highest in the world, but only 20% of US flows)
Environmental impact	China accounts for 45% of global renewables investment	… but it is still the world's largest source of carbon emissions (28% of total)
Culture	China has invested heavily in developing global cultural presence (12% of top 50 world movies shot in China in 2017 vs 2% in 2010)	… but cultural reach is still relatively limited (exports of television dramas are only one-third of South Korea's)

Source: McKinsey Global Institute analysis

11.4%

of global goods trade is Chinese, making it the world's largest trading nation

Dimension 1. Trade: China has become a major world trading nation

China has achieved global scale as both a supplier and a market. Consider that Chinese production accounts for up to 35 percent of global manufacturing output and Chinese demand accounts for 10 percent of global consumption, second only to the United States. China's global flows of goods and services are significant. The country became the world's largest exporter of goods in 2009, and the largest trading nation in goods in 2013. It exported $2.2 trillion in goods in 2017, making it the world's largest exporter. China accounted for 11.4 percent of global goods trade (including imports and exports) in 2017 (Exhibit 3). A study of 186 countries revealed that China was the largest export destination for 33 and the largest source of imports for 65.

Growth in exports has been exponential. In 2000, China exported only $111 billion, making it the tenth-largest exporter in the world at that point. In 2017, China imported $1.7 trillion of goods, the second-highest tally in the world, up from $125 billion in 2000. China today is the destination for more than one-fifth of the exports of about 20 countries on different continents. In 2016, it received 45 percent of exports from the Democratic Republic of Congo, 33 percent of Australia's, 28 percent of Chile's, and 24 percent of South Korea's, according to UN data. In goods trade, China has run a surplus since 1995. Its annual trade surplus increased from about $30 billion during the 1990s to $300 billion between 2000 and 2010, and from $400 billion to $600 billion between 2015 and 2017. This has contributed to an accumulation of foreign reserves, from $159 billion in 2000 to more than $3 trillion in 2017.

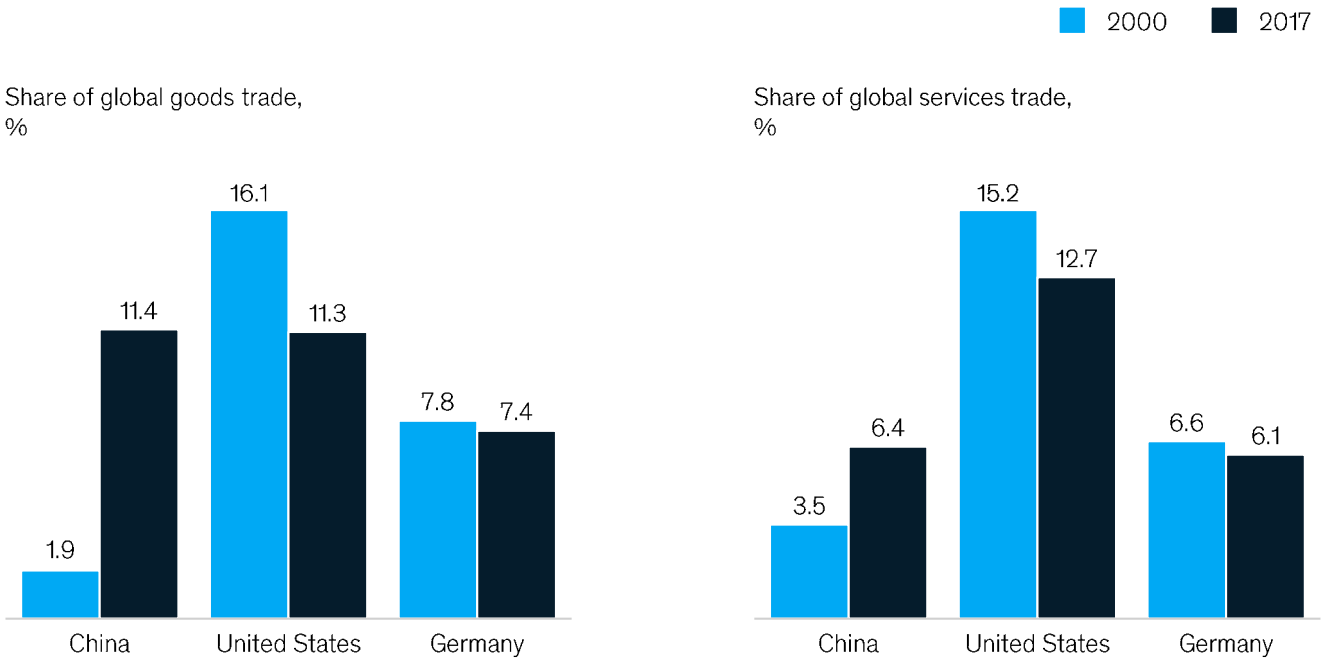
Even while China has become the world's largest exporter, it has continuously upgraded its manufacturing industry in capacity and quality. China's share of global manufacturing value added soared from only 1 percent in 1990 to 28 percent in 2018. China has increased its focus on developing capacity and know-how in knowledge-intensive manufacturing sectors such as chemicals, machinery, and motor vehicles.

China has expanded its services trade, too. It became the world's fifth-largest exporter of services in 2017 with $227 billion, triple the value in 2005. China also imported $468 billion in services in 2017, making it the second-largest services importer in the world. The country has run an increasing deficit in trade in services, from about $15 billion in 2009 to $265 billion in 2017. The latter figure largely reflected travel and tourism imports, which amounted to 54 percent of the total. China's largest service exports are construction and business services, which together account for 52 percent of the total. However, its global scale in services trade is not as significant as in goods. China accounts for 6.4 percent of global services trade, about half that of goods trade. However, global services trade is growing 60 percent faster than goods trade.[1]

[1] *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.

Exhibit 3

China has become the world's largest trader of goods, but its share of global trade in services is less significant.



Source: McKinsey Global Institute analysis

Dimension 2. Firms: Chinese firms have achieved global scale while foreign enterprises have been expanding their footprint in China

Many Chinese firms have attained global scale. The number of Global Fortune 500 companies headquartered in mainland China and Hong Kong rose from 22 in 2007 to 111 in 2018 (120 if Taiwan-based firms are included), compared with the 2018 US total of 126 (Exhibit 4). Recent MGI research on "superstar" firms found that in 1995 to 1997, no Chinese superstar firms were in the top 10 percent or 1 percent. However, by 2014 to 2016, Chinese companies made up 8 percent of the top 10 percent and 10 percent of the top 1 percent.[1]

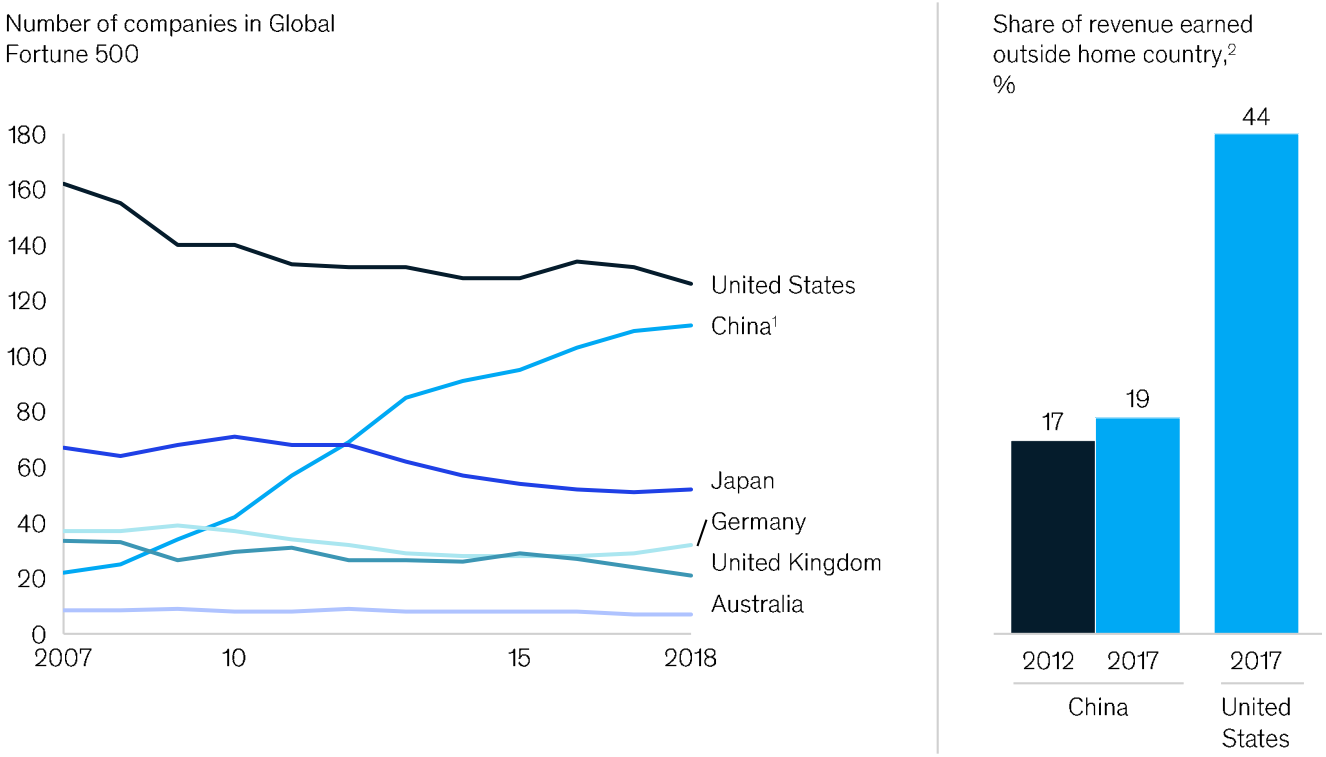
Large Chinese companies are not alone in expanding their global footprint. The number of Chinese firms operating around the world has grown at an estimated 16 percent a year since 2010 from 10,167 to 37,164 in 2016, according to the Ministry of Commerce. Their activity is spread across continents. Growth has been largest in North America at 20 percent a year, followed by Latin America at 17 percent and the rest of Asia at 16 percent. However, official statistics are highly likely to underestimate the expanding global presence of Chinese companies. Bottom-up analysis suggests that the number of Chinese firms active internationally may be much higher. We estimate, for instance, that about 10,000 Chinese firms are operating in Africa—triple the official figure—and find that 90 percent of them are private companies.[2]

[1] Superstar firms have become more diverse over the past 20 years. Diversity is calculated using the Simpson Diversity Index, which is equivalent to the Herfindahl Index in economics and effectively measures the "market share" of each country or region among the top 10 percent or top 1 percent of firms. See *Superstars: The dynamics of firms, sectors, and cities leading the global economy,* McKinsey Global Institute, October 2018.

[2] *Dance of the lions and dragons: How are Africa and China engaging, and how will the partnership evolve?* McKinsey & Company, June 2017.

Exhibit 4

China has nearly as many firms in the Global Fortune 500 as the United States, but most Chinese revenue is still earned domestically.



[1] Includes companies from mainland China and Hong Kong.
[2] Revenue analysis for China is for firms in Global Fortune 500; revenue analysis for US firms includes all firms in S&P 500.

Source: Bloomberg; Fortune; S&P; McKinsey Global Institute analysis

New breeds of global leaders are emerging from China. The country's digital giants are going global through investment, mergers and acquisitions, joint ventures, technology partnerships, and business expansion. In 2016, Alibaba's international e-commerce retail sales accounted for about 2 percent of the company's total revenue, and that share has increased to 6 percent, according to the company's 2018 annual report. Tencent has become the largest gaming company in the world through a series of acquisitions.[1] Drone maker DJI generates more than 80 percent of its sales overseas.[2] Smartphone manufacturer Transsion and electronics company Xiaomi are becoming leading players in emerging economies in Africa and in India. An estimated 200 million active monthly users of the social media app TikTok are outside China.[3] Car-sharing company Didi is moving into Latin America with a $1 billion acquisition of 99, a Brazilian competitor to Uber in the local market.[4] Chinese venture-capital funds are setting up shop in the United States and in emerging markets. Westlake Ventures, Sinovation, and Hax, which have varying degrees of affiliation with China, all have established offices in Silicon Valley.[5]

[1] Chris Morris, "China's Tencent folds yet another video game company into its empire," *Fortune,* August 30. 2018.
[2] Yang Yang, "DJI seeks new round of financing with company value of $15b," *China Daily,* March 21, 2018.
[3] Todd Spangler, "TikTok app nears 80 million U.S. downloads after phasing out Musical.ly, lands Jimmy Fallon as fan," *Variety,* November 20, 2018; Nicole Jao, *Douyin claims to have 400 million monthly active users in China,* TechNode, November 8, 2018.
[4] Ingrid Lunden, *Didi confirms it has acquired 99 in Brazil to expand in Latin America,* TechCrunch, February 8, 2018.
[5] Yunan Zhang, *Chinese government's path into Silicon Valley,* Tech News, February 10, 2017; and Matt Sheehan, *Does Chinese venture capital in Silicon Valley threaten US tech advantage?,* MacroPolo, April 26, 2018.

China is a major market for multinational corporations. The revenue of foreign invested industrial enterprises increased 12-fold between 2001 and 2018, according to China's National Statistics Bureau. In 2017, foreign enterprises earned 22 percent of Chinese manufacturing revenue. By 2018, about 80 percent of non-Chinese Fortune 500 companies had an established presence in China; of these, 40 percent had set up R&D centers. Foreign invested enterprises now account for 7 percent of employment in China, according to Ministry of Commerce data. The impact on employment across the entire supply chain could be even more significant. One study highlighted the positive spillovers to employment in domestic private firms from the presence of foreign firms between 1998 and 2004.[1] Another study found that inbound FDI had helped Chinese firms upgrade through the development of high tech as well as enhancing their access to international markets.[2]

While some Chinese firms have reached global scale, the number recognized as global leaders is still relatively small. Assessments of the top 100 brands by Forbes and Interbrand included only one Chinese company: telecommunications equipment and consumer electronics firm Huawei, in 79th and 68th place, respectively.[3] Chinese firms still earn the large majority of their revenue at home. In the case of Chinese firms in the Global Fortune 500, the share of revenue earned outside China steadily increased from 10 percent in 2007 to 19 percent in 2017. This compares with 44 percent of revenue earned outside the United States by US firms, according to Standard & Poor's.[4] The share of revenue earned abroad varies significantly by sector. Firms in the technology sector earn the highest share of revenue outside China, 42 percent, compared with 22 percent in industrials, 12 percent in chemicals, 9 percent in financial services, and 8 percent in automotive.

19%

of Chinese Global Fortune 500 firms earned outside China in 2017 vs

10%

in 2007

Dimension 3. Capital: China's capital markets are large but far from globalized

A large financial system has grown as the Chinese economy has expanded. China's banking system is now the biggest in the world at $40 trillion, and its stock and bond markets are the world's second- and third-largest, respectively. However, the financial system remains far from globalized. Foreign ownership in the Chinese banking system is only about 2 percent, compared with about 45 percent in the United Kingdom, 13 percent in the United States, 12 percent in the eurozone, and 7 percent in Japan. Foreign ownership of Chinese stocks is less than 2 percent, compared with 54 percent in the United Kingdom, 22 percent in the United States, 32 percent in Japan, and 31 percent in South Korea (Exhibit 5). China has new channels for foreign capital inflows and outflows, such as the Stock Connect program linking the Shanghai, Shenzhen, and Hong Kong stock exchanges, but its use has not met targets. Foreign ownership of Chinese bonds is less than 2 percent, compared with 41 percent in the United States, 12 percent in Germany, and 10 percent each in Japan and South Korea. Finally, the renminbi accounts for only 1 percent of global foreign reserves and 2 percent of global payments. This compares with 64 percent and 42 percent, respectively, for the dollar, and 20 percent and 30 percent for the euro.

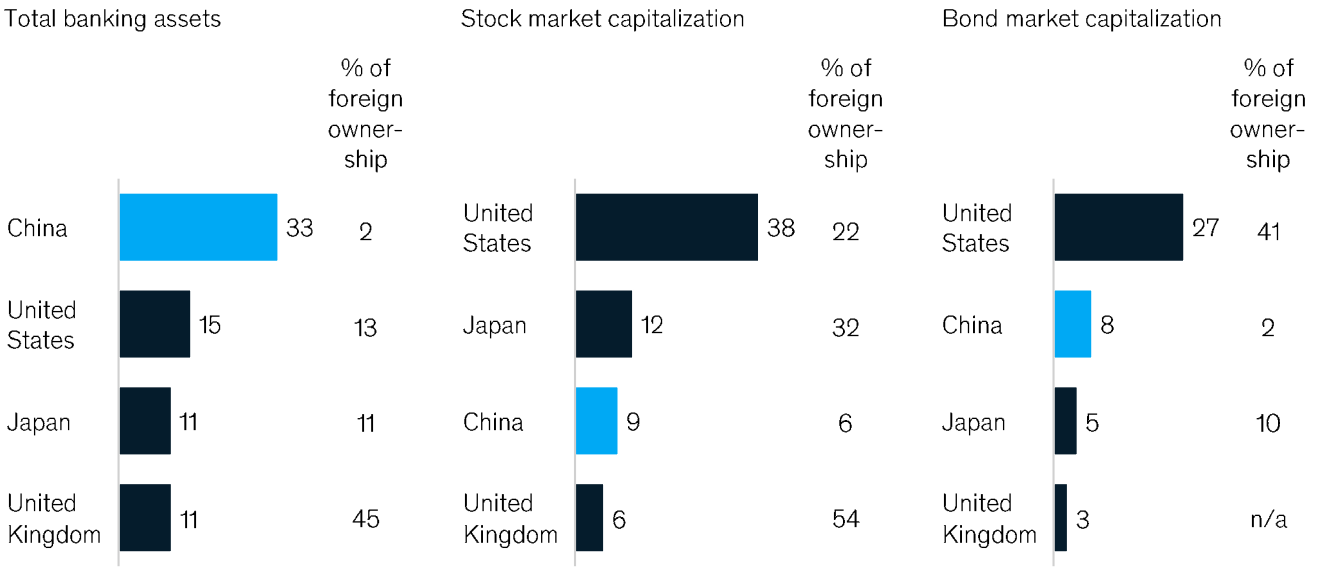
In capital flows, the situation is uneven. China was both the second-largest source of outbound FDI and the second-largest recipient of inbound FDI from 2015 to 2017. Inbound FDI increased substantially, from $41 billion to $136 billion, between 2000 and 2017, according to UNCTAD data, but still accounted for only about 2 percent of domestic investment. Its share of outbound FDI increased from just 0.1 percent in 2000 to 8 percent in 2017. China has become a major direct investor around the world, but FDI flows between China and the world have been relatively concentrated in specific regions. For instance, 60 to 80 percent of FDI inflows and outflows are with Asia. We note that this very high share may be misleading because Asia includes Hong Kong, which acts as a gateway for FDI flows in and out of China. Our bottom-up assessment of deals suggests that 33 percent of outward FDI went to North America and another 33 percent to Europe in 2016. In 2018, the ratio for North America dropped to 14 percent while the ratio for Europe increased to 40 percent.

1 Sune Karlsson et al., *FDI and job creation in China,* The International Centre for the Study of East Asian Development, Working Paper Series Volume 2007-24, November 2007.
2 Peter J. Buckley, Jeremy Cleff, and Chengqi Wang, "The impact of inward FDI on the performance of Chinese manufacturing firms," *Journal of International Business Studies,* 2002, Volume 33, Number 4.
3 "The world's most valuable brands," *Forbes,* forbes.com/powerful-brands/list/; and Best global brands 2018 rankings, Interbrand, interbrand.com/best-brands/best-global-brands/2018/ranking/.
4 Howard Silverblatt, *S&P 500 2017: Global sales, S&P Dow Jones Indices,* August 2018, us.spindices.com/indexology/djia-and-sp-500/sp-500-global-sales.

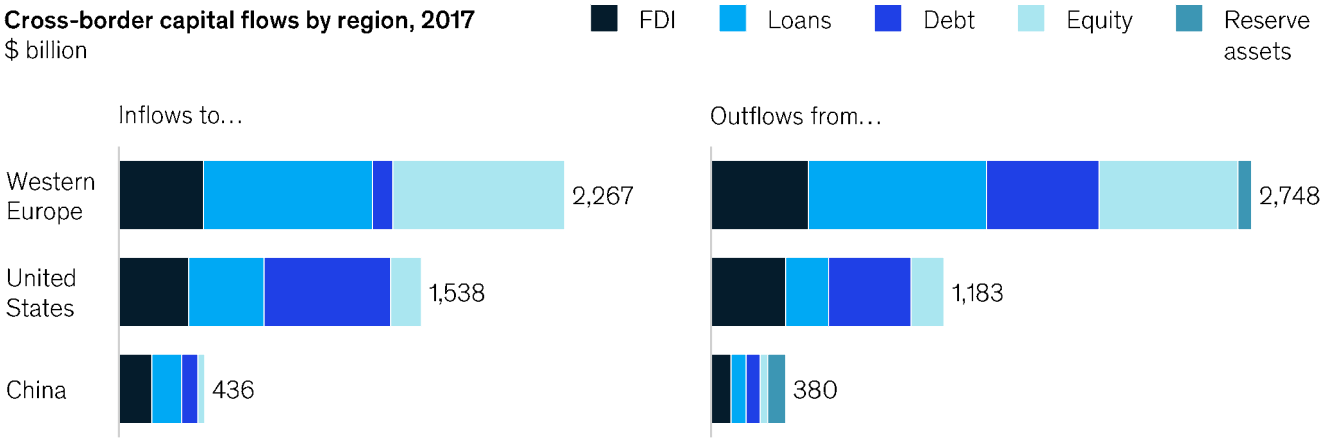
Exhibit 5

China's financial system is in the global top three, but foreign ownership is low, and cross-border flows are limited compared with developed economies.

Financial system size, 4 largest financial economies[1]
$ trillion



Cross-border capital flows by region, 2017
$ billion



[1] Latest year available.

Source: United Nations; BIS; McKinsey Global Institute analysis

Beyond FDI, cross-border capital flows include loans, debt, equity, and reserve assets. On these broader numbers, China's cross-border flows remain fairly limited considering the size of its economy. Inflows to China amounted to $436 billion in 2017, only 28 percent of the US total, and outflows from China were only $380 billion, 32 percent of the US total.

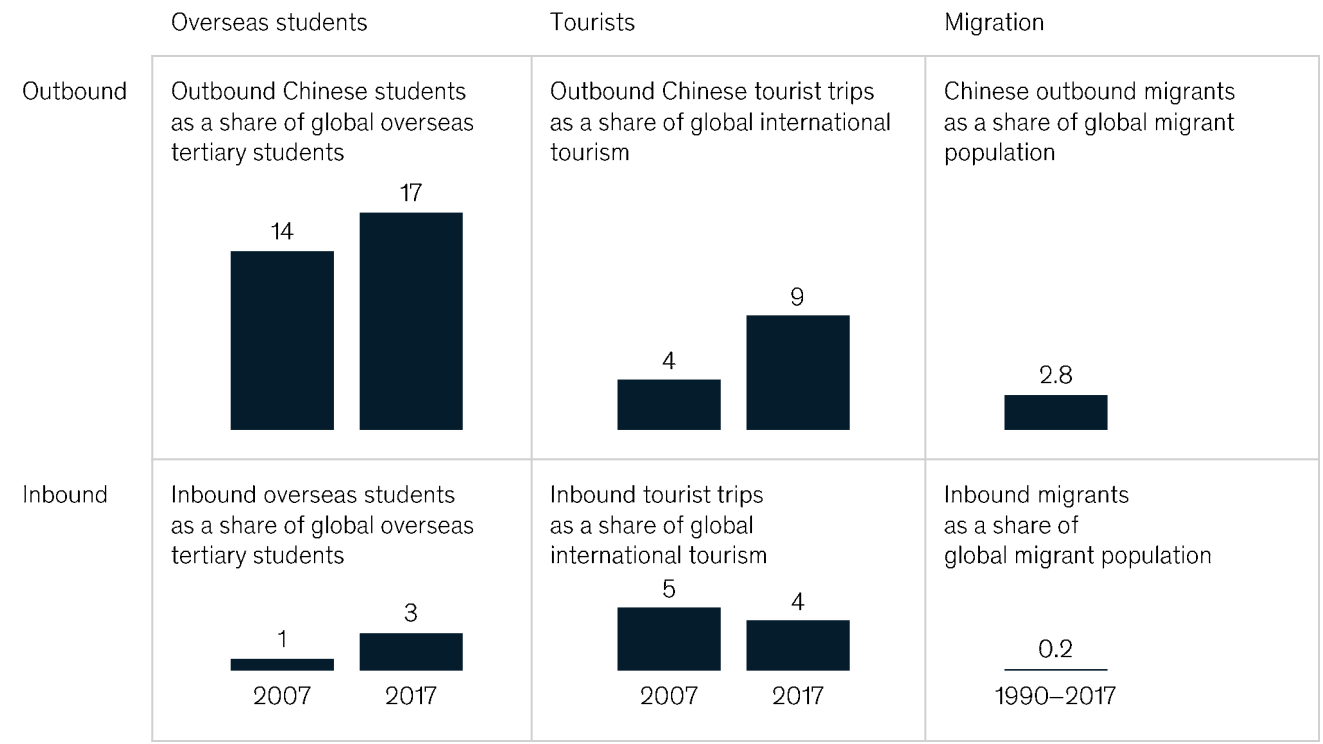
Dimension 4. People: Flows of people between China and the rest of the world are increasing rapidly but are still largely concentrated in certain geographies

At 1.4 billion people, China's population is the largest in the world, and cross-border flows between China and the world—notably students and tourists—have been growing rapidly (Exhibit 6). Nevertheless, flows of Chinese migrants are still a fraction of the global tally, and flows of students and tourists are concentrated in specific regions.

Exhibit 6

Outbound flows of Chinese students and tourists are significant, but migration and inbound flows remain relatively limited.

Chinese share of people flows,
%



Source: OECD; United Nations; World Bank: McKinsey Global Institute analysis

608,400

Chinese students went abroad to study in 2017,

16x

more than in 2000

In 2017 (the latest year for which data are available), 608,400 Chinese students went abroad to study, 16 times more than in 2000. This number dwarfs the figures for other countries. In 2016, 116,000 South Korean students and 200,000 Japanese students went overseas to study. Chinese student flows have been highly concentrated in the United States, the destination of 36 percent of all outbound Chinese students in 2015, compared to Australia with 12 percent and the United Kingdom with 11 percent. Chinese outbound students now account for 17 percent of all international tertiary-degree students. It is notable that 489,000 overseas Chinese students also returned to China. The ratio of overseas students returning to China to students going abroad rose from less than 20 percent in early 2000s to about 80 percent between 2013 and 2017.[1] The knowledge these students bring back is invaluable to China's economic development and innovation. China is also a major destination for foreign students. In 2016, it received 489,000 inbound students, making it the third-largest destination for international students; 60 percent of these foreign students came from Asian countries. South Korea, Thailand, and Pakistan are significant sources of inbound students with 16, 5, and 5 percent of the total, respectively.

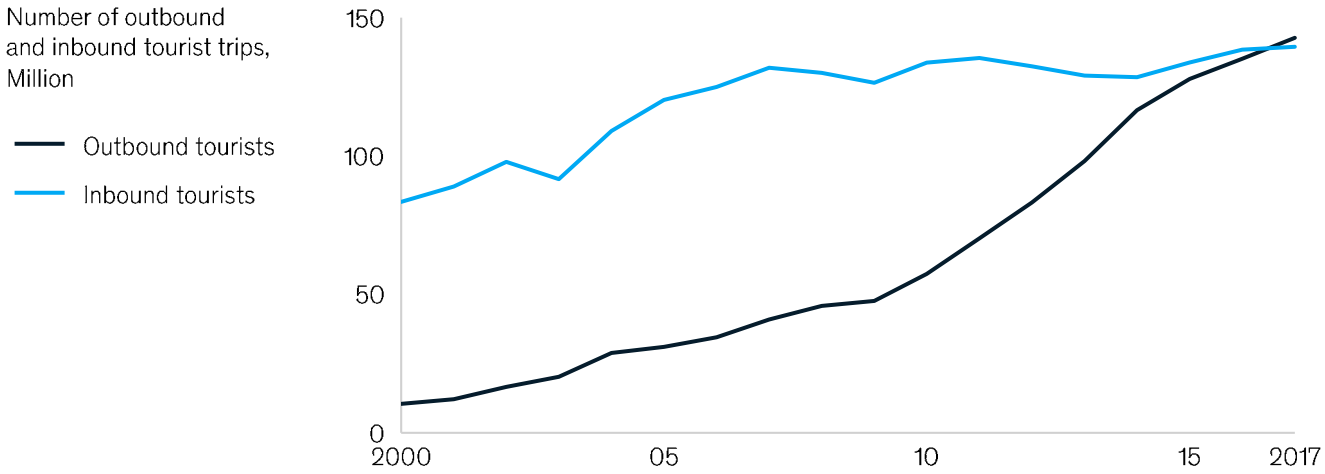
Chinese travelers are becoming a major presence around the world, with 143 million making trips for tourism in 2017. However, half of them went to Greater China (Hong Kong, Macau, and Taiwan) and an additional 29 percent went to Asia. In that year, 139 million tourists visited China, and 78 percent were from Asian economies, including those in Greater China (Exhibit 7).

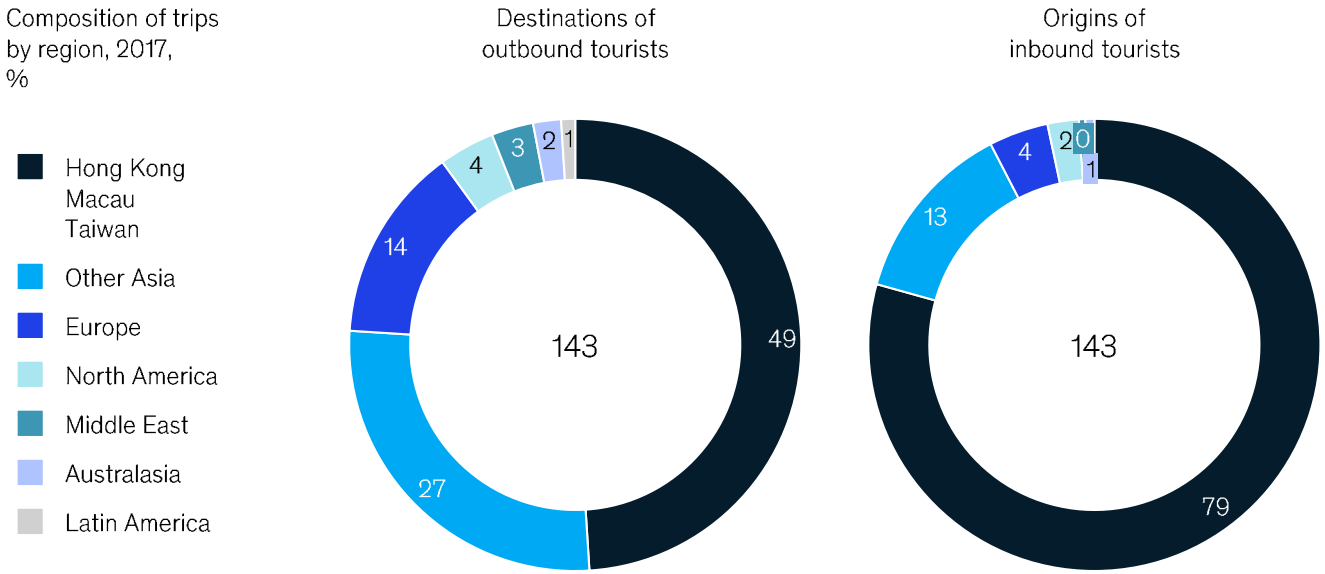
Flows of Chinese migrants have been less significant. Between 1990 and 2017, 4.3 million Chinese nationals migrated to different regions of the world, accounting for 3 percent of the global total, according to UN data. Chinese migrants are highly concentrated, with 67 percent relocating to other parts of Asia, and more than half of those to Hong Kong. Chinese tourists now account for 9 percent of all international trips, up from just 4 percent in 2007. Inflows of migrants to China have been limited. The total number of inbound migrants was just 376,000 in the same period, less than 1 percent of the global migrant population.

[1] United Nations Educational, Scientific and Cultural Organization; China Ministry of Education.

Exhibit 7

Outbound Chinese tourism has grown faster than inbound, but both are still geographically concentrated.





Note: Figures may not sum to 100% because of rounding.
Source: State Statistical Bureau of China; World travel and tourism council; McKinsey Global Institute analysis

Note: Figures may not sum to 100% because of rounding.

Source: State Statistical Bureau of China; World Travel and Tourism Council; McKinsey Global Institute analysis

Dimension 5. Technology: China has developed domestic capacity but still relies heavily on imports of several core technologies

China's R&D expenditure has grown tremendously over the past two decades. Spending on domestic R&D totaled about $10 billion in 2000, but had risen sharply to $260 billion in 2017 or almost half the US level in absolute terms (Exhibit 8).

The expansion of China's domestic R&D capacity and spending has reduced its relative reliance on foreign R&D and powered China to become a global innovation platform.[1] In absolute terms, technology imports have increased by 3 percent per year since 2000, but they declined in relative terms, from 14 percent of total R&D spending in 2000 to 3 percent in 2016. The ramping up of domestic R&D is reflected in the changing mix of China's technology imports. In 1996, about 82 percent of these imports were in equipment. By 2016, about 63 percent were in the form of IP and about 29 percent in technical services.

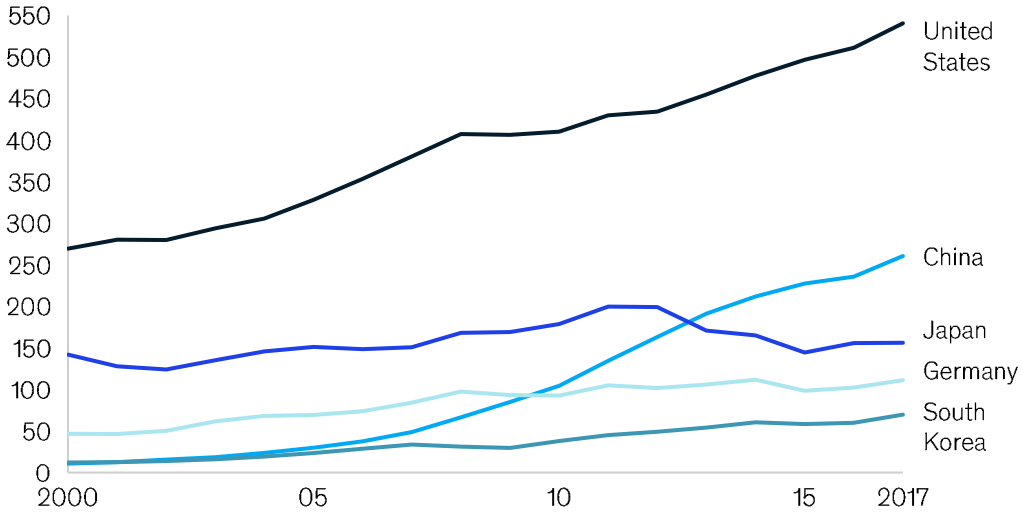
[1] *The China effect on global innovation,* McKinsey Global Institute, October 2015.

Exhibit 8

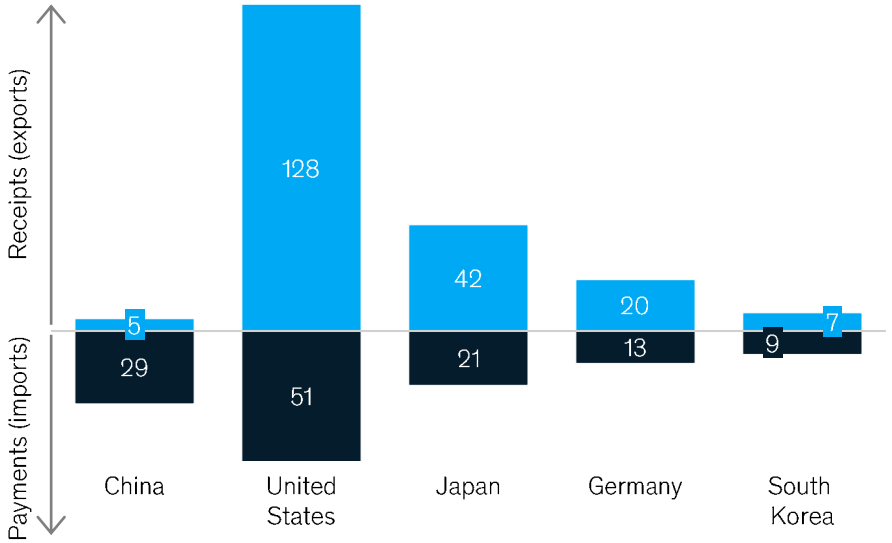
China has increased its investment in R&D but is still a significant importer of technology.

$ billion

R&D expenditure by country



Trade in IP charges by country, 2017



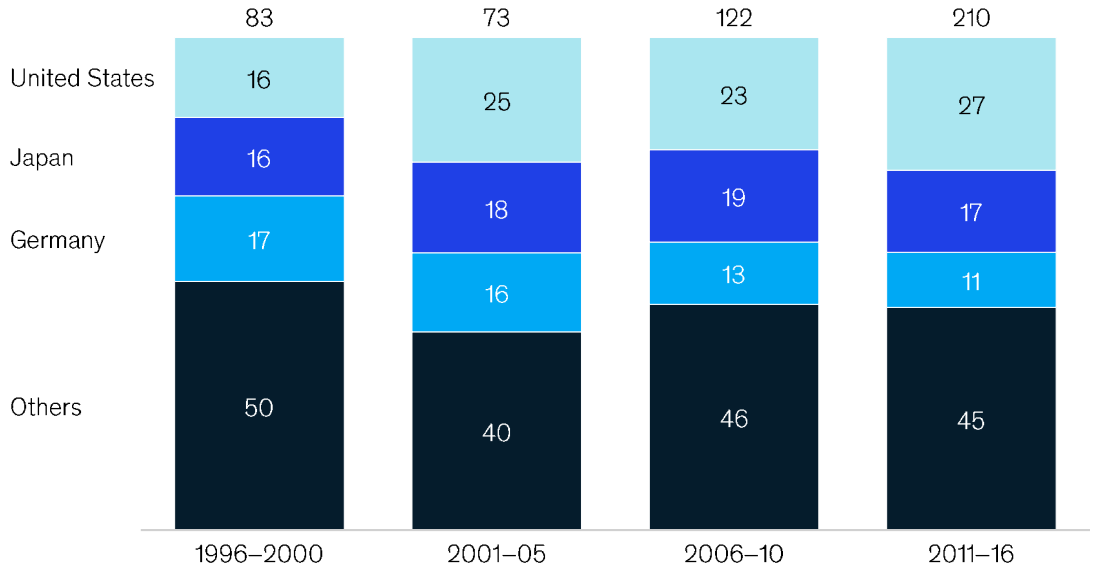
Source: OECD; IMF Balance of Payments; McKinsey Global Institute analysis

Nevertheless, China remains reliant on imports for several core technologies, and imports are highly concentrated geographically. More than half of China's purchases of foreign R&D come from only three countries: 31 percent from the United States, 21 percent from Japan, and 10 percent from Germany. This concentrated profile has been relatively stable over the past 20 years (Exhibit 9). China today exports its IP—in 2017, those exports had a value of about $5 billion, compared with only $80 million in 2000. However, IP exports amount to only about 17 percent of IP imports, and China's IP exports are still far smaller than those of other countries. For instance, in 2017, the United States exported $128 billion, Japan $42 billion, and Germany $20 billion. China's total IP imports are only 23 percent of US IP exports. While flows of technology in and out of China have increased in absolute terms, their growth has been much smaller than growth in domestic R&D investment.

Exhibit 9

More than half of China's technology imports have been sourced from the United States, Japan, and Germany since the 1990s.

China's technology import contract by source,[1]
%; $ billion



[1] Technology import contract includes procurement of equipment, IP, technical services, and others.
Note: Figures may not sum to 100% because of rounding.

Source: China Statistical Yearbook on Science and Technology; McKinsey Global Institute analysis

17x

increase in Chinese cross-border data flows 2010–17

Dimension 6. Data: Data flows are expanding but limited by local regulations

Globally, cross-border data flows have been growing rapidly. Between 2005 and 2017, global data flows increased 148-fold, and they have become a significant part of overall cross-border flows (goods, services, finance, people, and data).[1] China, which has been digitizing rapidly, today creates huge volumes of data, and cross-border flows have expanded rapidly, from 2,441 gigabits per second in 2010 to 41,310 in 2017, approximately a 17-fold increase. China is already in the global top eight for flows of data in bandwidth, having ranked 13th as recently as 2005 (Exhibit 10).

China's cross-border data flows are still relatively small given the vast size of its digital economy. China has about 800 million internet users, more than the United States and the EU combined, and more than 90 percent of them operate on mobile platforms. China accounts for more than 40 percent of global retail e-commerce transactions.[2] However, because of restrictions on data flows between China and the world—popularly known as the "Great Firewall"—data generated in China tend to stay in China, while Chinese citizens have limited access to some global services. China's cross-border data flows are only about 20 percent of US data flows, and an even smaller percentage of the flows of smaller economies including the Netherlands, Singapore, and Sweden.

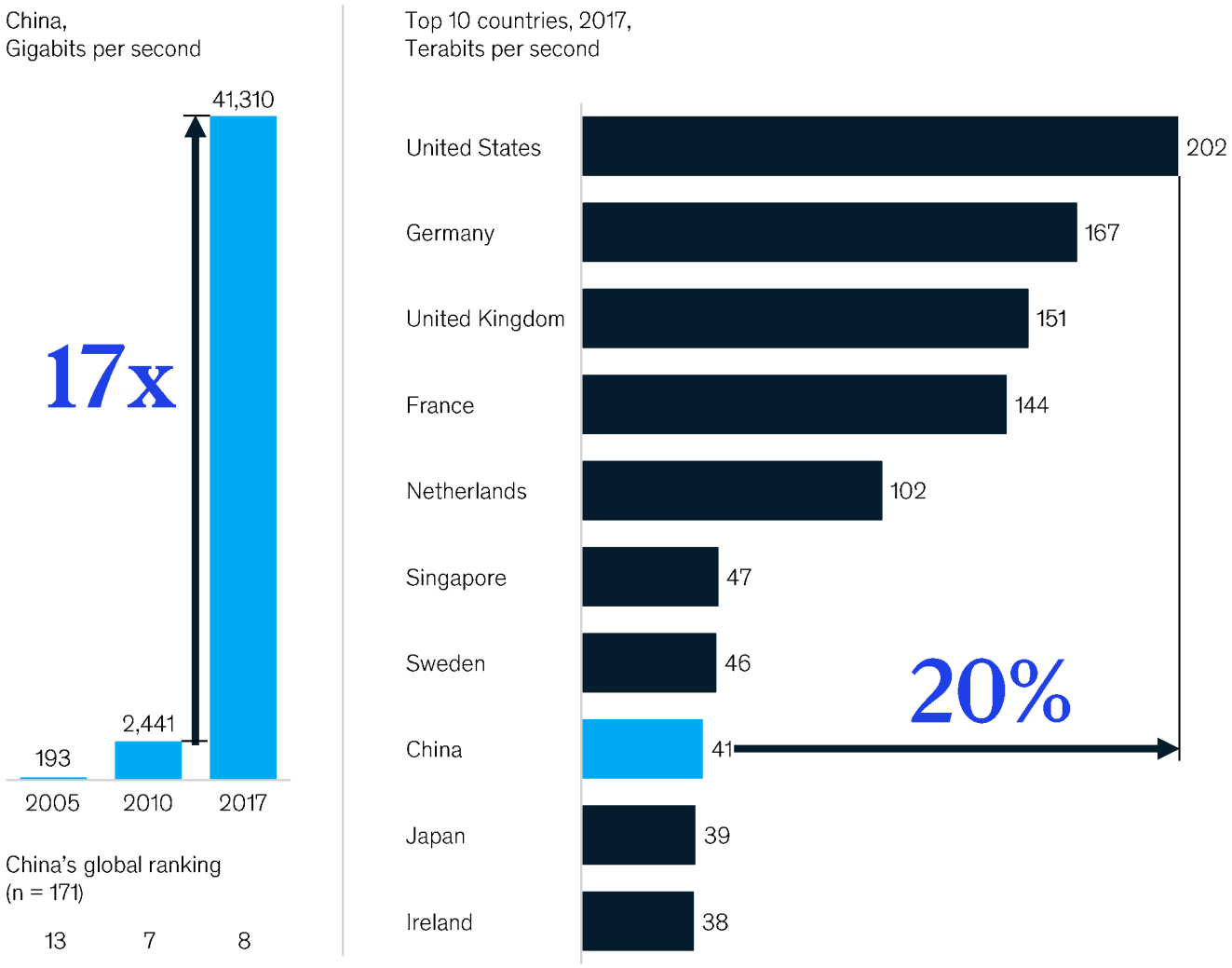
[1] *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019; and *Digital globalization: The new era of global flows,* McKinsey Global Institute, February 2016.

[2] *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017.

Exhibit 10

China's cross-border data flows increased 17-fold from 2010 to 2017 but remain only 20 percent those of the United States.

Total cross-border data flow (bandwidth)



Source: TeleGeography; McKinsey Global Institute analysis

45%

of global investment in renewable energy came from China in 2017

Dimension 7. Environmental impact: China has reduced its carbon intensity significantly but remains the world's largest source of emissions

China has been the world's largest source of carbon emissions since 2006, and today accounts for 28 percent of the annual global total. To put this in context, China's emissions in 2017 were larger than the combined emissions of the next three sources, the United States, India, and Russia. Although China has reduced its carbon intensity (the amount of carbon emitted per unit of GDP), it still surpasses that of many countries, including the United States (0.31 kg of CO_2 emitted per unit of GDP), India (0.29 kg), Japan (0.26 kg), and the United Kingdom (0.15 kg) We should note that lower-income countries are typically expected to have higher carbon intensities due to limited access to energy-efficient technologies. However, China's current carbon intensity (0.47 kg) is higher than the average of low- and middle-income countries (0.36 kg).

China has made strenuous efforts to achieve deep cuts in its emissions. In 2009, China became a signatory of the Paris Agreement, announcing a goal of reducing its carbon intensity by 40 to 45 percent from 2005 levels by 2020, and 60 to 65 percent by 2030. Coal consumption has been capped to reduce greenhouse gas emissions; it peaked in 2013.[1] In 2011, China introduced a carbon emissions trading program, which imposes emissions quotas on businesses and allows those producing more than their allocated share to buy unused capacity from those that emit less.[2] These efforts appear to have been successful in reducing China's dependence on emission-heavy activities. By the end of 2017, China's carbon intensity had fallen to 0.47 kilograms of CO_2 emitted per unit of GDP, compared with 0.80 kilograms in 2005—a 40 percent decrease, three years ahead of schedule, according to Global Carbon Atlas data.

China has become a world leader in investment in renewable energy. In 2017, it accounted for $127 billion, or 45 percent, of the global total of $280 billion invested in renewables. This was three times larger than US and European investment, each $41 billion (Exhibit 11).

Solar dominated with a record $85 billion, up 58 percent over 2016, while investment in wind power was $36.1 billion, down 6 percent; small hydro was $2.4 billion (down 7 percent); and biomass and waste-to-energy at $1.5 billion (also down 7 percent). The cost of solar continues to fall in China, and more projects are being deployed on rooftops and in industrial parks, for instance. Solar is not limited by government quotas, and large energy consumers are now installing solar panels to meet their own demand, with a minimal premium subsidy. A breakdown of China's solar surge in 2017 reveals that $19.6 billion of the investment was in systems of less than one megawatt. [3]

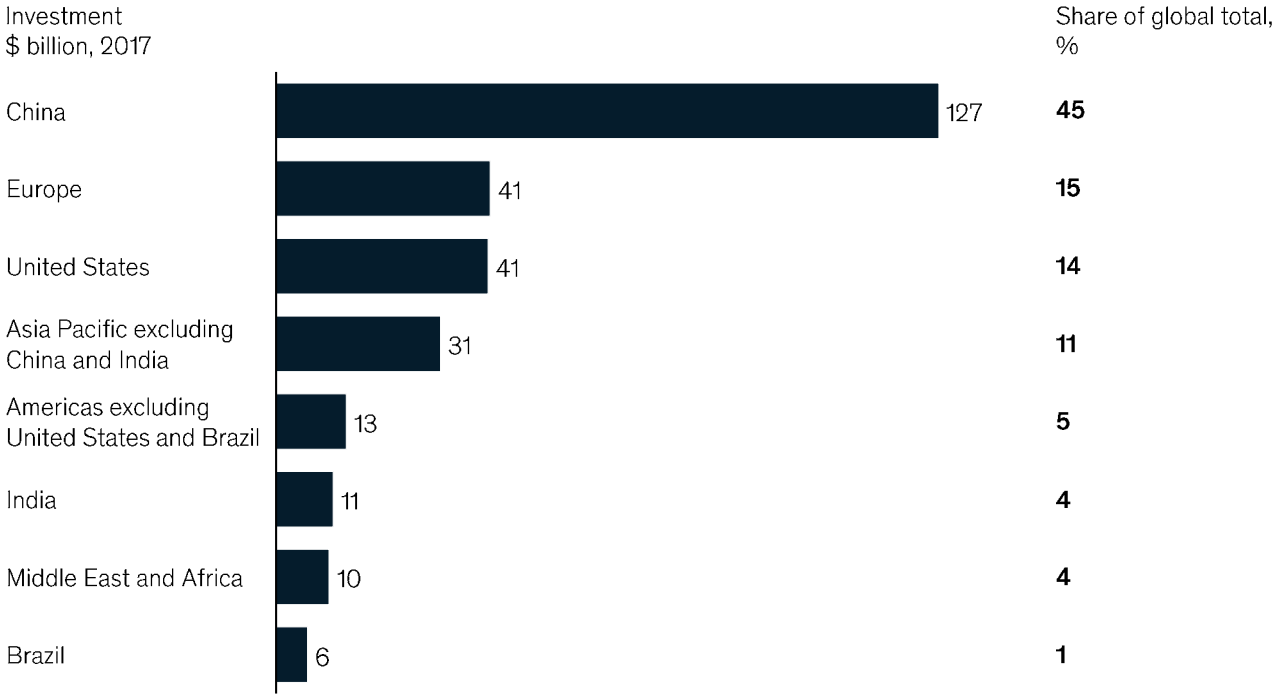
China's strong push toward renewable energy is largely intended to address domestic challenges, notably pollution. The median exposure of China's PM 2.5, an indicator of air pollution, was 3.7 larger than the OECD average in 2016, according to the World Bank.

[1] PlanetPolicy, "China's peaking emissions and the future of global climate policy," blog entry by Qi Ye, September 12, 2018, brookings.edu/blog/planetpolicy/2018/09/12/chinas-peaking-emissions-and-the-future-of-global-climate-policy/.
[2] *China meets 2020 carbon target three years ahead of schedule,* United Nations Climate Change News, March 28, 2018.
[3] *Global trends in renewable energy investment report 2018,* United Nations Environment Programme and Bloomberg New Energy Finance, 2018.

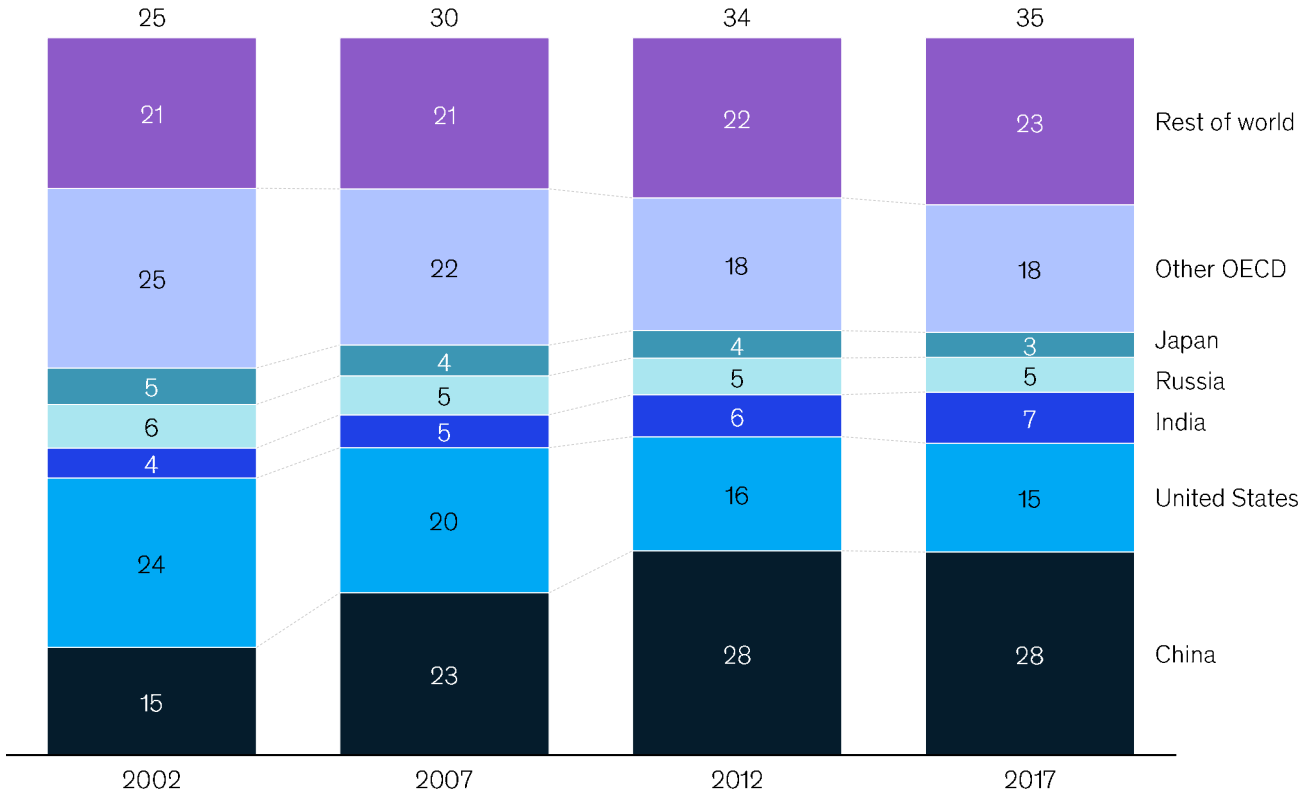
Exhibit 11

China is the world's largest investor in renewable energies and its largest carbon emitter.

Investment in renewable energies, $ billion, 2017



Carbon emissions by country, $GtCO_2$, %



Note: Figures may not sum to 100% because of rounding.

Source: World Bank; Global Carbon Atlas; McKinsey Global Institute analysis

Dimension 8. Culture: Chinese has increased investment in becoming a global cultural player but has not yet achieved mainstream relevance

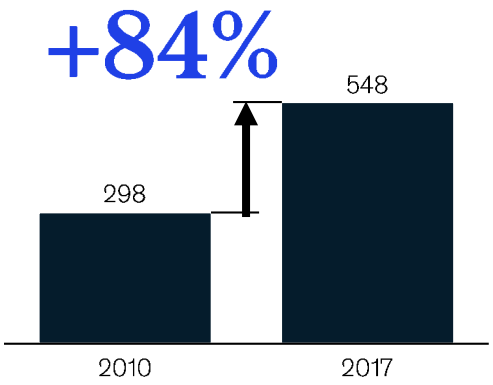
China has increasingly invested in developing its cultural presence globally by, for instance, putting money into the film industry and expanding support of educational institutions and courses (Exhibit 12).

Exhibit 12

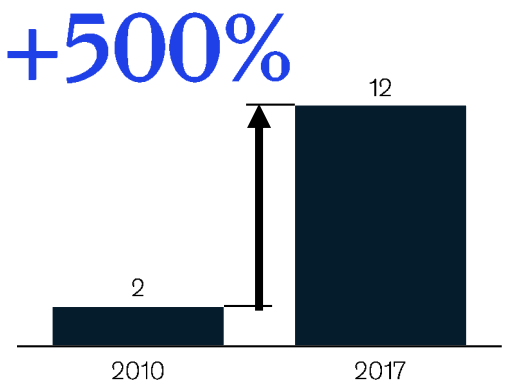
China has invested heavily in developing its cultural presence, but its reach is still not global.

China has invested more in developing global cultural assets …

Education
Number of Confucius Institutes

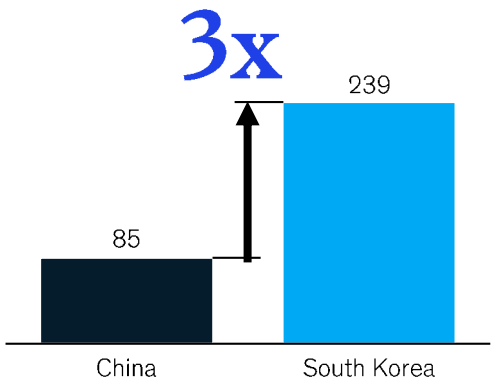


China in movies
% of Global 50 films shot (at least partially) in China

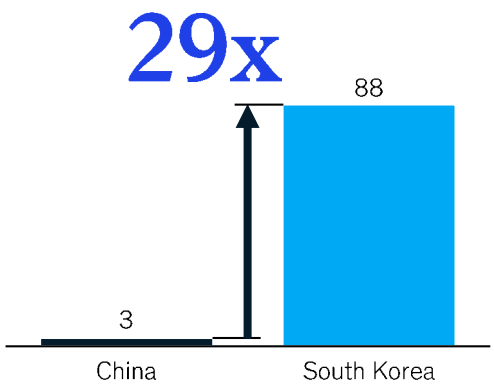


… but has achieved limited success in global cultural presence

TV series
Exports of TV dramas, 2017 or the latest available year
$ million



Popular music
Number of subscribers of top ten Chinese and South Korean singers, million



Source: Literature search; company websites; McKinsey Global Institute analysis

The top 50 films (worldwide) starring a Chinese actor increased from 4 percent of the top 50 in 2010 to 22 percent in 2017, and the global share of films shot in China rose from 2 percent to 12 percent. These statistics point to China's growing investment in film financing. China has also influenced global cinema through the size of its market. Box office sales were $9 billion in 2018, having grown at 21 percent annually over the previous five years. China is now the second-largest market in the world in box office sales, behind the United States at $12 billion.

$9b

Chinese box office sales in 2018

Another area in which China has been spreading its cultural influence is language. In 2004, the Office of Chinese Language Council International began investing in Confucius Institutes around the world to spread Chinese language education. Today, 548 institutes have been established in 154 countries. The number of students studying Chinese as a second language grew sixfold between 2010 and 2017. However, we note that some are re-evaluating the role of these institutions and may be scaling back their support.[1]

Beyond public provision of education, a number of Chinese companies have partnered with multilateral organizations to spread technological know-how and best-in-class digital infrastructure to emerging markets. One example is Alibaba's partnership with UNCTAD—the eFounders Fellowship Programme—which admits 1,000 entrepreneurs every year from developing countries to experience transformative e-commerce and technology in China.[2]

However, Chinese culture is not yet mainstream around the world. Consider, for instance, that the number of subscribers to top ten Chinese musicians on a global streaming platform is only 3 percent that of top ten South Korean artists. Chinese exports of television dramas in terms of value are only one-third of South Korea. China's culture and entertainment industry remains relatively closed. On the OECD's FDI restrictiveness index, which considers foreign equity restrictions, discriminatory screening, personnel restrictions, and operational restrictions, China's media sector is defined as completely closed (an index of 1.0). China imposes a quota on the number of foreign films that can be shown domestically; since 2012, the quota has stood at 34 films per year, up from 20 in 2002.

• • •

China's opening and internationalization have powered its growth, vaulting the economy to its status as the world's largest in PPP terms. However, China's scale has not always translated into global integration. Now, as we explore in the next chapter, the relationship between China and the world appears to be changing. China's exposure to the rest of the world is declining even as the world's exposure to China continues to rise.

[1] It has been observed that the Confucius Institutes are a conduit for expanding Chinese influence and even espionage. See "U.S. universities shut down Confucius Institutes," *China Digital Times*, https://chinadigitaltimes.net/2019/01/u-s-universities-shut-down-confucius-institutes/; Alex Lo, "Confucius Institutes: China's benign outreach or something more sinister?," *South China Morning Post*, July 16, 2018. For a refutation of the charge by some US politicians that the Confucius Institutes are linked to Chinese government espionage, see, for instance, David Dodwell, "US politicians linking Confucius Institutes with espionage is taking paranoia to the extreme," *South China Morning Post*, September 29, 2018.

[2] eFounders Fellowship Programme, UNCTAD, unctad.org/en/Pages/eFounders-Initiative.aspx.

南浦大桥

2 The relationship between China and the world is changing

The relationship between China and the world is shifting. As China's economy rebalances away from investment and trade and moves toward a model led by domestic consumption, its exposure to the rest of the world is declining. Meanwhile, because of China's scale and prominence as a trading nation, the rest of the world's exposure to China's economy is rising. The exposure of different sectors and countries varies enormously, according to our analysis of 20 sectors in 73 economies around the world.

China's exposure to the world has declined, while the world's exposure to China has risen

We have measured the shift in the relationship between China and the world. Focusing on three of the eight dimensions discussed in chapter 1, we analyzed the mutual exposure of China and the rest of the world on trade, capital, and technology—dimensions for which we can obtain reliable data on bilateral and multilateral global flows.[1] The new MGI China-World Exposure Index compares the magnitude of flows relative to China's economy to the magnitude of flows relative to other large economies (for details on our methodology, see Box 2, "Elements we considered for the China-World Exposure Index").

In absolute terms, trade, capital, and technology flows between China and the rest of the world have increased substantially. China's trade volume (including both imports and exports) increased from $470 billion in 2000 to $4.3 trillion in 2017. China's outbound FDI flows grew from $915 million to $120 billion over the same period, while inbound FDI flows increased from $41 billion to $136 billion. China's technology imports grew from $1.8 billion to $48 billion. However, in relative terms, from 2000 to 2017 the world's exposure to China increased on all three dimensions, while China's exposure fell. The rest of the world's aggregate index rose from 0.4 in 2000 to 1.2 in 2017, while China's exposure to the world peaked at 0.9 in 2007 and declined to 0.6 by 2017.

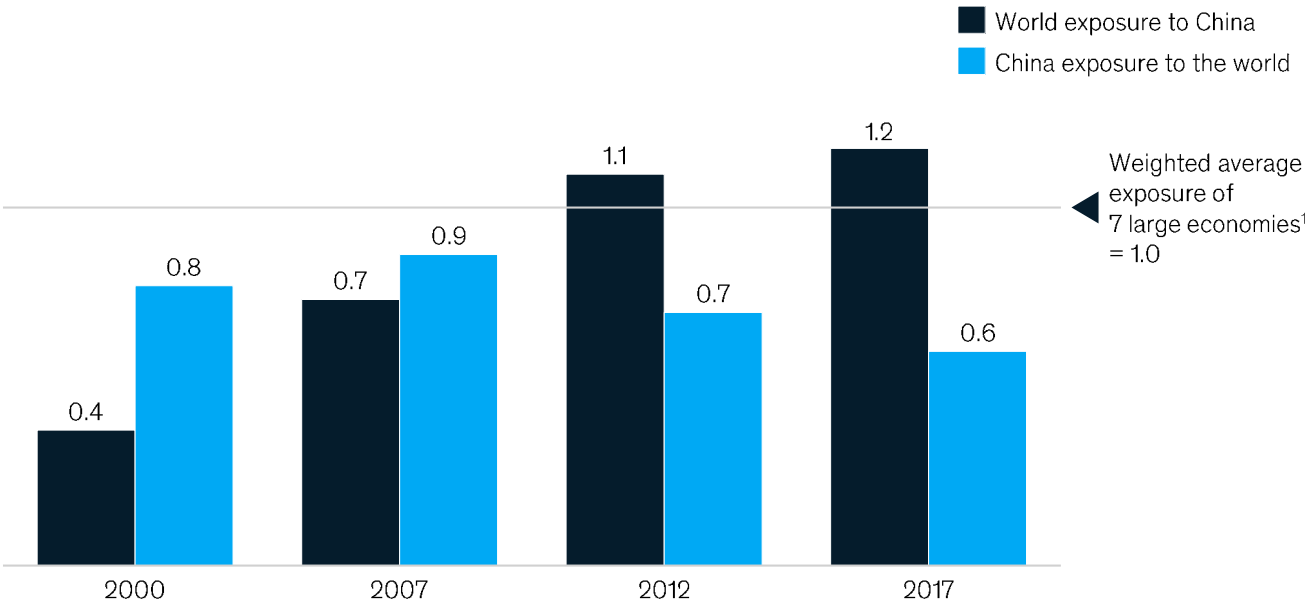
[1] On trade, we measured the importance of China as a market and as a supplier of goods and services to the global economy. On capital, we measured the importance of China as a supplier of financing and as a destination for investment. On technology, we measured the importance of Chinese technological exports to global R&D spending.

The decline in China's exposure to the rest of the world (albeit with growth in absolute terms) reflects the increasing scale of China's domestic economy, which flows data do not capture. The rising exposure of the rest of the world to China reflects the increasing role that China plays as (1) a supplier to, and a market for, other economies; (2) a capital provider and investment destination; and (3) a technology exporter and importer (Exhibit 13).

Exhibit 13

China has been reducing its relative exposure to the world while the world has been increasing its exposure to China.

China-World Exposure Index (trade, technology, and capital)



[1] China, France, Germany, India, Japan, United Kingdom, and United States.

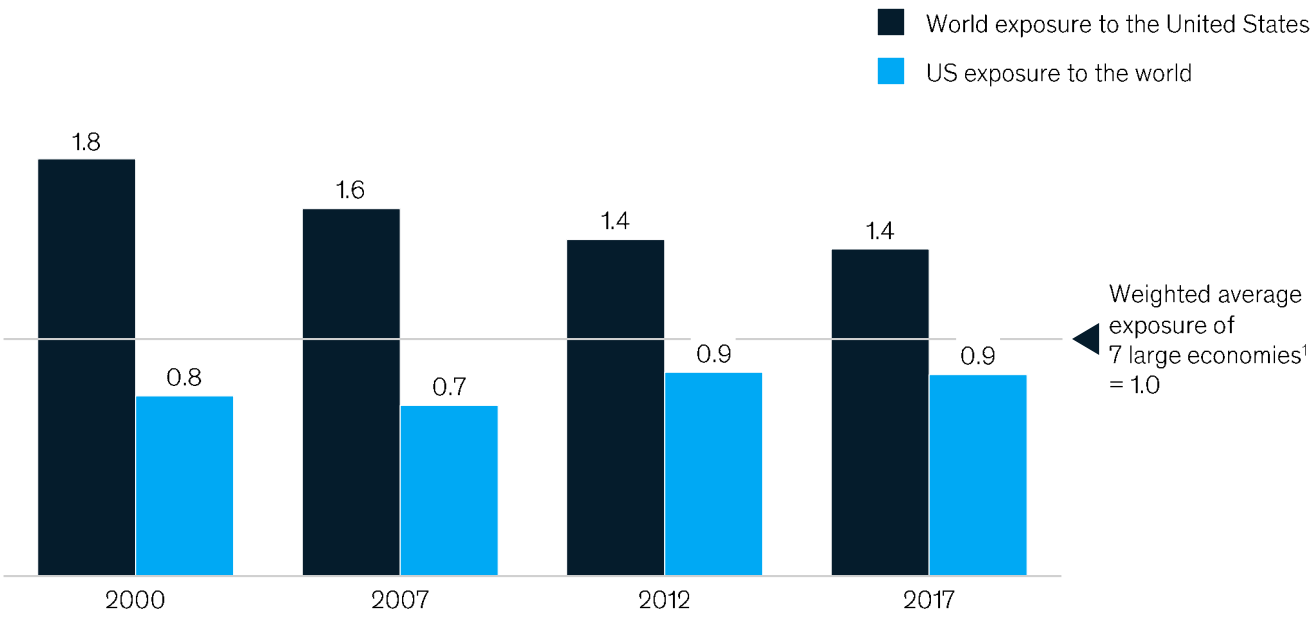
Source: McKinsey Global Institute analysis

To put this in context, consider that the world's relative exposure to the US economy has fallen from 1.8 to 1.4 over the same period. This may imply that countries around the world have increasingly connected to a broader range of economies, diversifying their trade, capital, and technology flows. Nevertheless, the world's exposure to the United States is above 1 (which is the average of seven countries), suggesting that it is more exposed to the United States than the average of large economies. Conversely, the United States has maintained its relative exposure to the world at around 0.7 to 0.9, suggesting that the United States has kept pace with increased trade, capital, and technology flows across the world (Exhibit 14).

Exhibit 14

The world's exposure to the United States is declining.

US-World Exposure Index (trade, technology, and capital)



[1] China, France, Germany, India, Japan, United Kingdom, and United States.

Source: McKinsey Global Institute analysis

Box 2

Elements we considered for the China-World Exposure Index

The new MGI China-World Exposure Index consists of five components covering trade, capital, and technology. On trade, MGI considered exposure to a country's supply (exports divided by rest-of-world consumption) and demand (imports divided by rest-of-world gross output). On capital, MGI considered exposure to a country's capital (outbound FDI divided by rest-of-world inbound FDI) and investment opportunities (inbound FDI divided by rest-of-world outbound FDI). On technology, MGI considered exposure to a country's technology exports (exports of IP and technology services and equipment divided by rest-of-world R&D spending). We acknowledge that the absolute sizes of economic flows to and from China (in exports and imports, inbound and outbound FDI, and technology flows) have increased during this period. For more details on how we developed the China-World Exposure Index, please see the technical appendix.

China's exposure to the world has declined

China's exposure to the world in relative terms has fallen because the major driver of its economic growth is no longer trade or investment but rather domestic consumption. In 11 of the 16 quarters from January 2015 to December 2018, consumption contributed more than 60 percent of total GDP growth (Exhibit 15). In 2018, about 76 percent of GDP growth came from domestic consumption, while net trade actually made a negative contribution to GDP growth. As recently as 2008, China's net trade surplus amounted to 8 percent of GDP; by 2018, that figure was estimated to be only 1.3 percent—less than either Germany or South Korea, where net trade surpluses amount to between 5 and 8 percent of GDP.

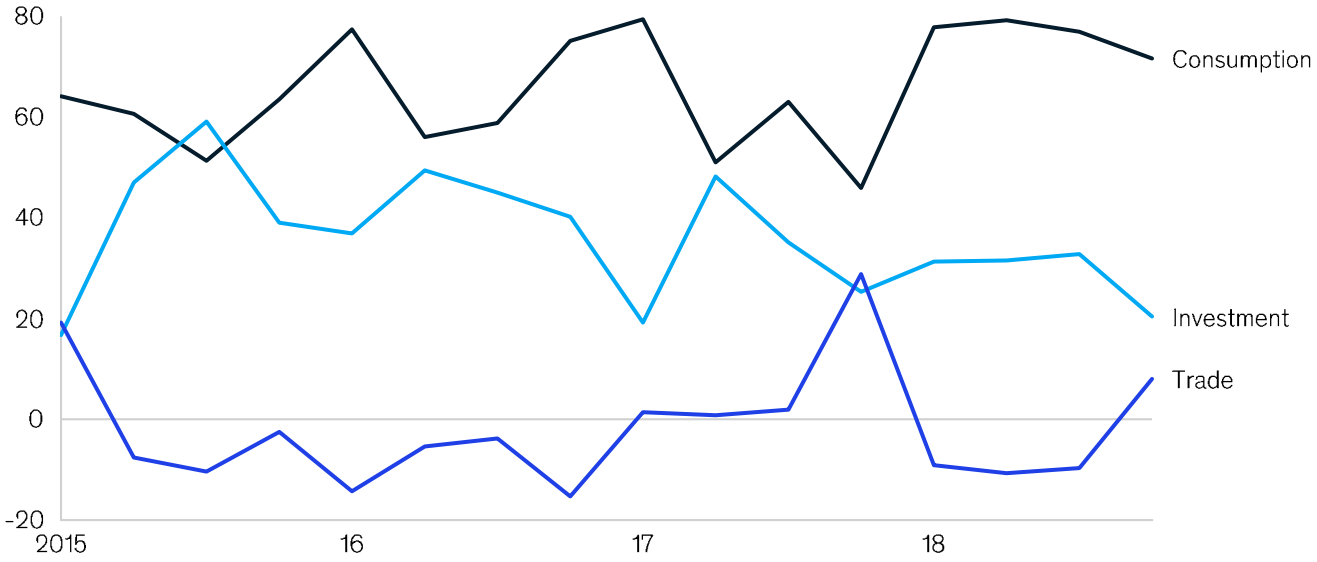
China is now the world's largest market in many categories. China accounts for 40 percent of global consumption of textiles and apparel, 28 percent of automotive vehicles, and 38 percent of computers and electronics, for example. As a result of this large-scale domestic demand, more of what is made in China is now sold in China. Within the industry value chains we studied, China exported 17 percent of the gross output it produced in 2007. By 2017, it was exporting just 9 percent of its output. This is roughly on a par with the United States, but a far smaller share than for Germany (34 percent), South Korea (28 percent), or Japan (14 percent).[1] These are significant changes that alter China's priorities and shift the dynamics of its relationship with the world.

[1] *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.

Exhibit 15

In 11 of the 16 quarters from 2015 to 2018, consumption contributed more than 60 percent of China's GDP growth.

Contribution to GDP growth by expenditure component, %



Source: CEIC; McKinsey Global Institute analysis

China remains relatively more closed than developed economies on trade, capital, and technology flows. On trade, after joining the WTO, China cut tariffs from an average of about 16 percent in 2000 to about 9 percent in 2009. However, UNCTAD data show that the average tariff rate edged up to 10.6 percent in 2017, although it may fall to 7.5 percent as the result of new tariff cuts announced in 2018.[1] However, this figure remains far higher than the US and EU average of about 3 to 4 percent.

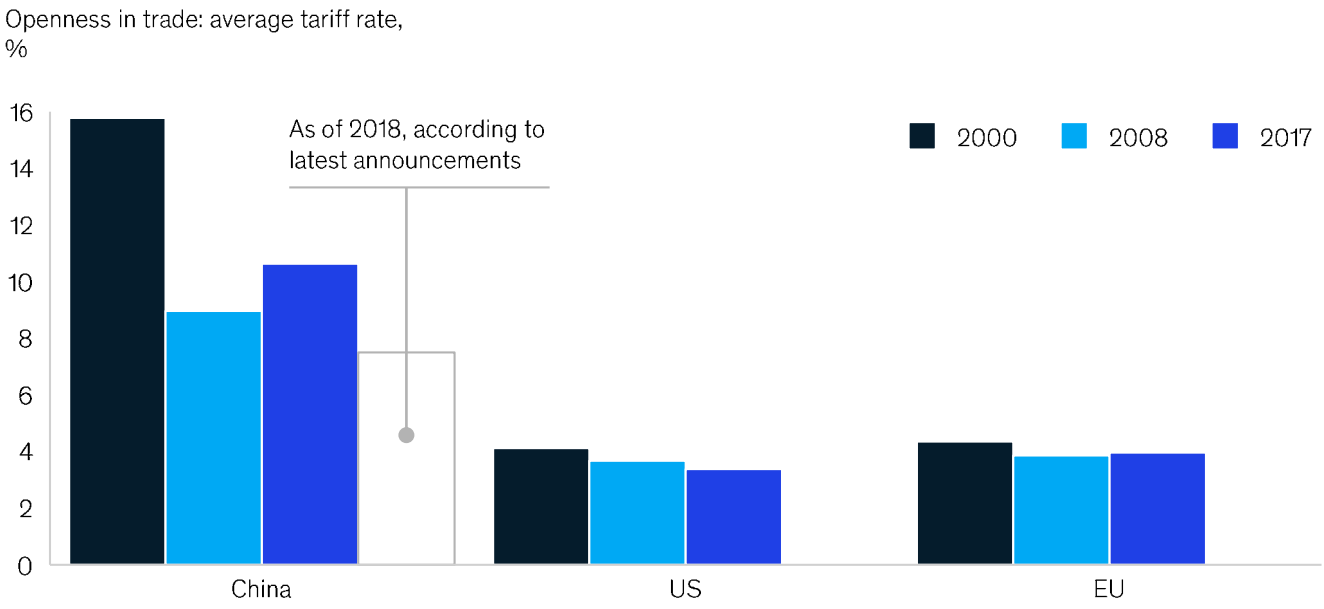
On capital, China has opened doors to foreign capital, but barriers persist. On the OECD's FDI restrictiveness index in manufacturing, China's level declined from 0.38 to 0.1 between 2003 and 2017. However, its services index remained 0.39 (down from 0.74 in the same period), far higher than the 0.08 OECD average (Exhibit 16). We also note that these figures may not capture a range of policy changes made by China since 2017 (the latest year for the OECD index), such as reducing the number of sectors on the negative list. In the services sector, restrictions on foreign firms operating in the Chinese market are four to five times higher than the OECD average.[2] In restaurants, hotels, and retail and wholesale trade, China is already relatively open. However, it is much more closed than OECD countries in sectors including media, telecom, financial services, healthcare, and education. This situation has led to latent consumer demand for services because the availability of high-quality services has not matched Chinese consumers' willingness and ability to spend (see chapter 5 for more detail).

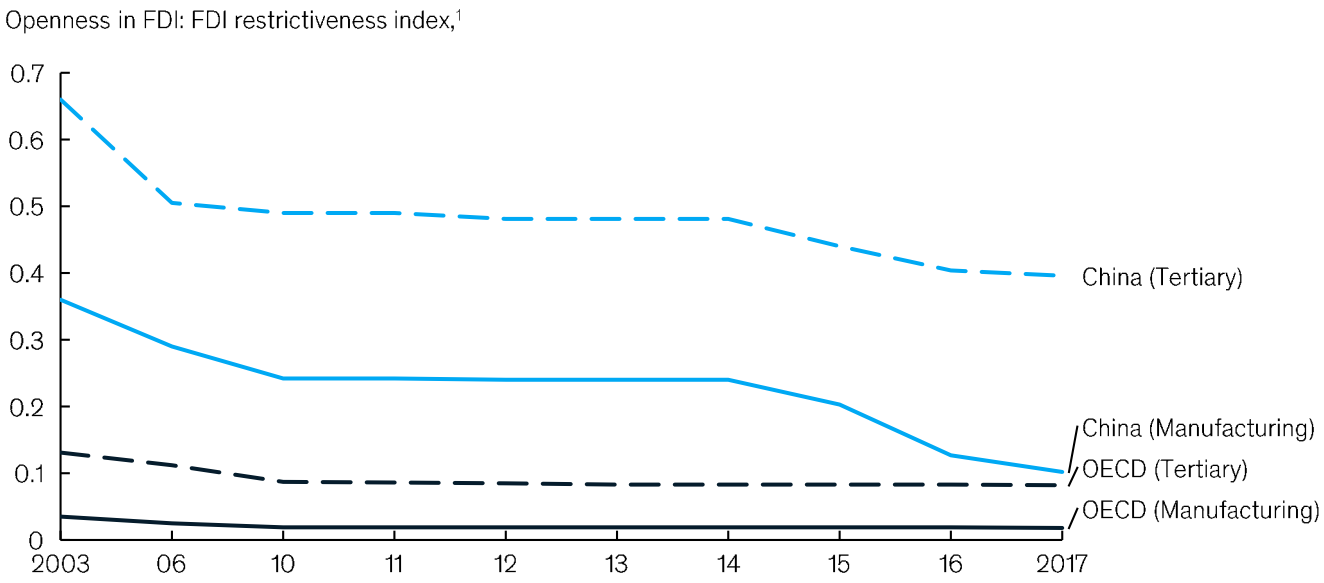
[1] Tariff figures are simple averages drawn from announcements collected by UNCTAD. We note that, on a weighted-average basis, enforced tariffs are lower overall, although the comparison with developed markets is still of the same order of magnitude.

[2] The OECD index was last updated in 2017, and these calculations may not capture changes to Chinese regulations since then.

Exhibit 16

China's economy is still relatively restricted on trade tariffs and FDI, and it has scope to open up further.





[1] We use the OECD's FDI Regulatory Restrictiveness Index; 0 is open and 1 is closed.

Source: UNCTAD STAT; OECD; McKinsey Global Institute analysis

We note that China has gradually been improving the regulatory environment for inward investment. Since 2013, China has used a "negative list" approach to regulating foreign investment—apart from instances specified on that list, foreign capital can enter the Chinese market after the investor registers. The number of specified restrictions fell from 139 in 2014 to 48 in the 2018 revision (Exhibit 17). Furthermore, the negative list details plans to open up certain sectors in some respects. For instance, joint venture requirements in the financial services sector will be removed by 2021. Moreover, China has launched 12 free trade zones in the past five years, and there have been calls to make these zones less restrictive to foreign investors. For instance, the EU Chamber of Commerce in China said that producers were often separate from customers, and that the zones would be more attractive if pilot reforms were pursued in new mainland sectors for foreign investment rather than piloting reform in areas that were "ring-fenced" from the rest of the country.[1]

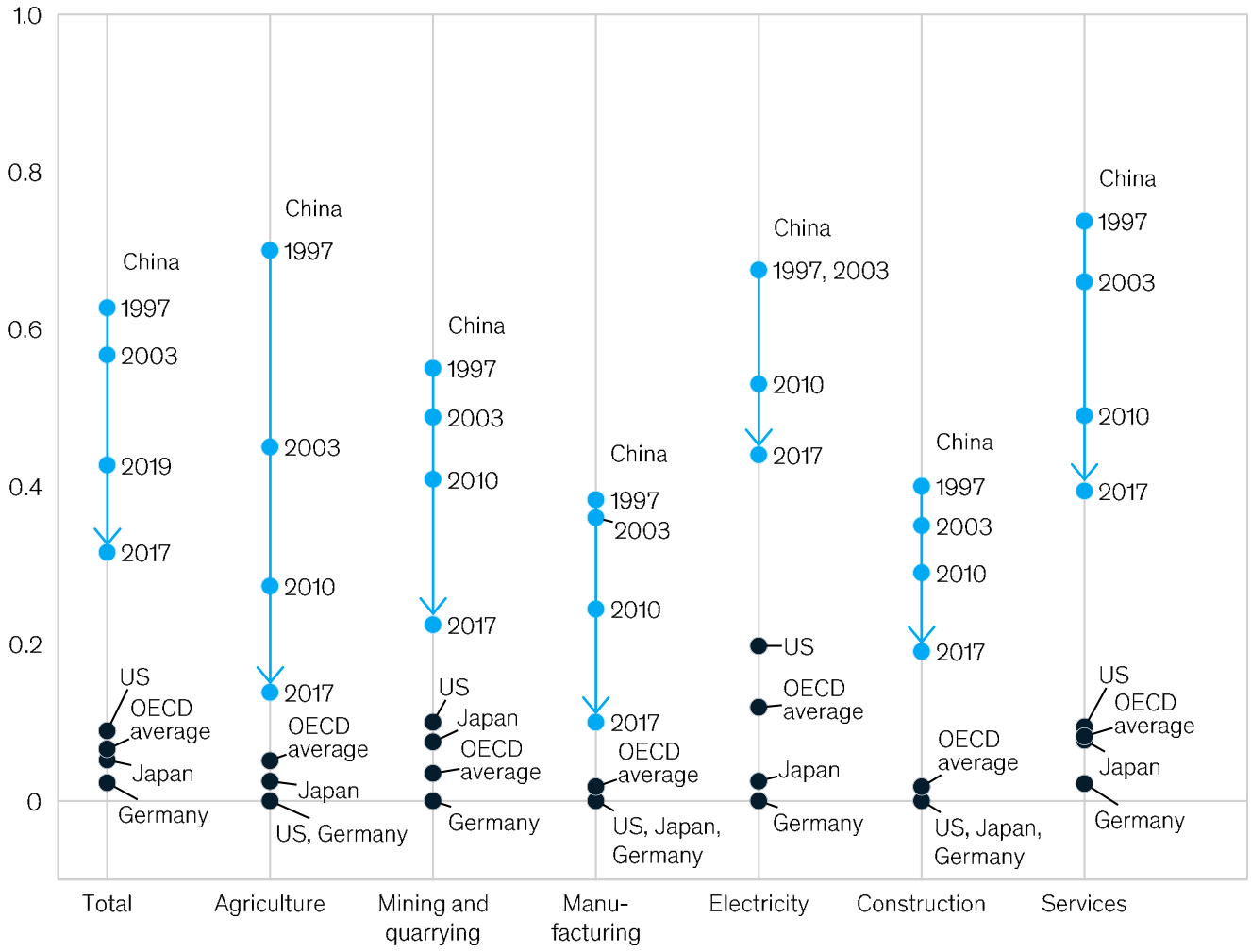
On technology, China is emphasizing policies that support growth of its domestic high-tech industries and boost local players' capabilities. China's Made in China 2025 plan sets targets for local companies' market share of 40 to 90 percent in 11 of 23 subsectors prioritized by the government.[2] Launched in 2015, the plan identifies aspirations for China's position in global high-tech manufacturing.

[1] Amanda Lee, "China pushes reforms in free trade zones as skepticism grows among foreign investors," *South China Morning Post*, November 23, 2018.
[2] *Made in China 2025 key area technology innovation green book*, National Manufacturing Power Building Strategy Advisory Committee, October 2015.

Exhibit 17

China has increased its openness to inbound FDI across sectors but is still less open than OECD economies on average.

OECD FDI Regulatory Restrictiveness Index[1]



[1] OECD measures the restrictions placed on inbound FDI for a given country and sector, and assigns an index value that reflects how restricted a sector is; 0 is open and 1 is closed.

Source: OECD; McKinsey Global Institute analysis

The exposure of the rest of the world to China has increased

Many countries have large and increasing exposure to the Chinese economy. We studied country-level exposure to Chinese market (exports to China), supply (imports from China), and capital (inbound FDI from China). Of the 73 economies we studied, 69 had increased their relative exposure to Chinese imports, 72 had increased their relative exposure to Chinese exports, and 58 had increased their relative exposure to Chinese capital since 2007.

Furthermore, almost all sectors are exposed to China, as would be expected given the sheer size of its economy. China accounts for more than 20 percent of global consumption in 17 out of 20 categories in manufacturing (see the next section for a detailed discussion). China is an important market for sectors that produce inputs for manufacturing, and an important supplier for sectors that consume manufacturing output. The scale of China's manufacturing sector and its trade with the rest of the world has increased dramatically. Consider that in 2003 to 2007, China's share of global manufacturing output was only 12 percent. In 2013 to 2017, that share jumped to 33 percent. Similarly, Chinese trade (including both imports and exports) accounted for 5 percent of global output in 2003 to 2007, and 8 percent in the latter period. High-tech sectors are particularly exposed because of the complexity of the global value chain.

33%

Chinese share of global manufacturing output in 2013–17 from

12%

in 2003–07

We note that our sector analysis does not focus on services but rather on primary and manufacturing sectors, which are more traded and for which more data are available. Nevertheless, it is evident that demand for services in China has risen significantly along with increasing income, and the world's exposure to China has correspondingly grown, largely in exporting services to China. China is the world's largest importer of services. According to China's Ministry of Commerce, service imports amounted to $468 billion in 2017 (compared with exports of $227 billion).[1] However, the exposure of the rest of the world to China's services sector is highly uneven because of a range of restrictions. Service imports are highly concentrated in only a few sectors. For example, 54 percent of those imports, or $255 billion, came from travel and tourism. Chinese imports are also significant in maritime and air transport, totaling $59 billion and $27 billion in 2017, respectively. Other sectors are closed, and there is little exposure to Chinese demand. For example, Chinese imports of financial services amounted to only $1.6 billion in 2017, less than 1 percent of total imports and a steep decline from a peak of almost $5 billion in 2014. Healthcare and education are also highly restricted in foreign participation (see chapter 4 for more details).

Three out of four groups of countries have the most exposure to China's economy

All countries have increased their exposure to China, but three groups of countries stand out (Exhibit 18). Asian economies rely on their regional proximity to China for greater integration in global value chains and investment. Resource-rich countries (for example, South Africa and Australia) and intermediate goods producers (for example, South Korea) depend on China as an export market. Emerging markets elsewhere in the world (for example, Egypt and Pakistan) have high exposure to Chinese outbound investment.

[1] *Report on China's services import 2018,* Ministry of Commerce of the People's Republic of China, November 2018, images.mofcom.gov.cn/english/201811/20181114155703850.pdf.

Exhibit 18

Countries with regional proximity, significant trade in resources, and cross-border capital flows are the most exposed to China.

Exposure Least Most

Archetypes	Countries	Exports to China as a share of domestic production, %		Imports from China as a share of domestic consumption, %		Inbound FDI from China as a share of domestic investment, %	
		2003–07	2013–17	2003–07	2013–17	2003–07	2013–17
Regional proximity exposure	South Korea	8	11	4	6	<1	<1
	Malaysia	8	11	5	11	<1	6
	Philippines	12	8	6	14	6	<1
	Singapore	10	11	12	18	2	5
	Vietnam	3	11	6	13	3	1
Resource-related exposure	Australia	4	16	3	7	<1	3
	Chile	5	13	3	10	<1	<1
	Costa Rica	9	9	2	5	3	<1
	Ghana	<1	8	5	18	<1	4
	South Africa	2	15	2	6	<1	3
Capital exposure	Egypt	<1	<1	3	5	1	13
	Pakistan	<1	1	3	7	2	8
	Peru	4	7	1	5	2	6
	Portugal	<1	2	<1	3	<1	3
Developed economies	United States	<1	2	3	6	<1	<1
	Germany	2	4	2	3	<1	<1
	Japan	4	5	3	5	<1	<1
	United Kingdom	<1	2	2	5	<1	2

Source: IHS Markit; National Bureau of Statistics; McKinsey Global Institute analysis

Asian economies are tightly linked with China through regional supply chains

Exposure to China in Asian countries has historically been high and in recent years has grown, especially in their exposure to Chinese exports. In many cases, these countries are tightly connected to China in global value chains, and trade with China accounts for a large portion of domestic gross output. China is the largest trading partner for Malaysia, Singapore, and the Philippines. In some Asian economies, Chinese capital is equally significant. Consider that between 2013 and 2017, Chinese outbound FDI was equivalent to 6 percent of domestic investment in Malaysia, and 5 percent in Singapore.

Singapore and China are particularly notable for their high level of mutual exposure. Trade with China amounts to 11 percent of Singapore's gross output and 18 percent of its consumption. Singapore's exposure to China on trade was already high even ten years ago (trade with China was equivalent to 10 percent of gross output and 12 percent of consumption, and FDI was equivalent to 2 percent of domestic investment). With time, Singapore's ties with China have become even closer, partly because of a free-trade agreement between the two in 2009, which has gradually increased the volume of trade. In 2017, Singapore's integrated circuits exports to China alone amounted to $20 billion. Singapore is also becoming a larger investment destination for Chinese capital, as part of the broader Belt and Road Initiative (BRI). More than 20 percent of China's outbound investment in BRI countries is in Singapore. In 2017, Singaporean SOE Surbana Jurong formed a joint venture with China Highway to collaborate on infrastructure projects.[1] Beyond BRI, the Singaporean government has collaborated with China to invest in the Suzhou Industrial Park, Tianjin Eco-city, and the Chongqing Connectivity Initiative, to give three examples.

South Korea also has high exposure to China. One-quarter of South Korea's exports go to China, and many sectors are heavily integrated with Chinese supply and demand in both intermediate and final goods. We assessed South Korea's exposure to China by looking at sector-level trade flows (see Box 3, "South Korea—a sector-geographic view of trade exposure").

[1] Ann Williams, "Surbana Jurong sets up joint venture with China Highway in design, consultancy services," *Straits Times,* March 22, 2017.

Box 3

South Korea—a sector-geographic view of trade exposure

One way of looking at a country's exposure to China is to consider its trade relationships on a sector level. MGI analyzed South Korea's exposure to China through four sector-level metrics: imports of Chinese intermediate goods as a share of total intermediate consumption; imports of Chinese final goods as a share of total final consumption; exports of intermediate goods to China as a share of total intermediate output; and exports of final goods to China as a share of total final output (Exhibit 19).

This analysis revealed that, in 2014 (the latest available data), South Korea's computer and electronics and electrical equipment sectors were most exposed to trade with China—unsurprising, considering the high level of global integration in these sectors around the world. South Korea is exposed to Chinese imports and exports of both intermediate and final goods, highlighting the various positions China plays in the technology value chain.

Other sectors that are particularly exposed to China include textiles and apparel, where imports from China account for 25 percent of final consumption, reflecting China's importance in light manufacturing sectors. Conversely, South Korea's rubber and plastics manufacturing sector relies heavily on Chinese demand; China is the largest importer, with 9 percent of domestic production of intermediate goods and 16 percent of final-use goods accounted for by its imports. Finally, South Korea's media sector is exposed to Chinese demand, reflecting the growing popularity of South Korean pop culture in television and music.

Exhibit 19

South Korea's exposure to trade with China is driven by computers and electronics, apparel imports, and media exports.

Least exposed → Most exposed

Archetypes	Sectors	South Korea's exposure to Chinese supply: Imports of Chinese intermediate goods as a share of intermediate consumption, %	South Korea's exposure to Chinese supply: Imports of Chinese final goods as a share of final consumption, %	South Korea's exposure to Chinese demand: Exports of intermediate goods to China as a share of intermediate output, %	South Korea's exposure to Chinese demand: Exports of final goods to China as a share of final output, %
Heavily exposed to China overall	Computers and electronics, optical products	10	17	21	32
	Electrical equipment	5	21	8	20
	Furniture, safety, fire, other	5	14	9	8
Heavily exposed to Chinese demand	Printing and media	2	5	1	16
	Rubber and plastics	4	10	9	16
	Chemicals	3	3	12	11
	Other machinery and equipment	5	3	6	14
	Coke and refined petroleum products	1	2	6	9
Heavily exposed to Chinese supply	Textiles and apparel, leather	4	25	6	7
	Wood and wood products	3	29	1	4
	Other nonmetallic minerals	5	14	5	5
	Mining and quarrying	1	12	<1	<1
Relatively low exposure to China	Fabricated metal products	5	4	2	4
	Other transport equipment	5	5	5	2
	Basic metals	4	6	3	3
	Motor vehicles and trailers	4	<1	5	3
	Paper and paper products	2	7	1	<1
	Food, beverages, and tobacco	1	5	<1	2
	Agriculture, forestry, and fishing	2	2	<1	<1
	Pharmaceuticals	3	1	1	5

Source: World Input-Output Database; McKinsey Global Institute analysis

Resource-rich countries are highly exposed to China's demand

Resource-rich countries experienced some of the highest rates of increase in their exposure to China, driven by a dramatic rise in what China imports. For example, Chinese imports account for 15 percent of gross output in South Africa, compared with only 2 percent in the period from 2003 to 2007. Similarly, Chinese imports now account for 16 percent of gross output in Australia, compared with just 4 percent in the period from 2003 and 2007. The significant growth in exposure is driven by China's rise as a manufacturer for the world, which has increased its demand for raw materials and intermediate inputs subsequently used in further processing to create final goods.

Australia stands out for its extraordinarily high exposure to Chinese demand. It is one of China's largest sources of imports of natural resources, and China is Australia's third-largest export destination. Iron ore alone makes up 48 percent of Australia's exports to China (minerals and metals in total account for 84 percent of exports). And 21 percent of Australia's mining and quarrying output is exported to China. These statistics reveal its high level of exposure to Chinese demand and the importance of China's manufacturing sector to Australia's economy. As we have noted in this paper, such a high level of exposure to Chinese demand can affect commodity prices, as we are seeing now in Australia. As Chinese steelmaking has slowed, Australia's government has issued forecasts of iron ore price declines from $69 per tonne in 2017 to $53 in 2019.[1]

As the second-most-popular destination for Chinese students, Australia is highly sensitive to Chinese demand for education. Australian education exports to China amounted to 10 billion Australian dollars, a rise of 260 percent in just ten years.[2] In case of less engagement between China and the world, Australia could be hit by second-order effects. Declining business sentiment could limit Chinese demand for raw materials and therefore have a negative impact on Australian exports. Geopolitical uncertainty could decrease Chinese consumers' willingness to spend, limiting the number of students studying abroad.

$24.3b

Chinese FDI to Egypt in mid-2018

Some emerging economies and smaller developed economies are increasingly exposed to Chinese investment

Although exposure to trade with China among emerging economies may still be relatively low compared with other countries, inbound FDI from China is playing a bigger part in domestic investment in these countries, particularly in Africa. Chinese outbound FDI now is equivalent to 13 percent of domestic investment in Egypt, and 8 percent in Pakistan. In some cases, exposure to Chinese capital is driven by the country's involvement in BRI, although we note that Chinese investment in African economies predated the announcement of the initiative.[3]

Egypt, in particular, has experienced dramatic growth in its exposure to Chinese capital. Its cumulative FDI from China totaled $24.3 billion by mid-2018 (including an announced but not yet finalized $20 billion investment in a project to construct a new administrative capital east of Cairo).[4] The investment has gone to many large infrastructure projects including railways, oil refineries, and energy ventures. China has also codeveloped a special economic zone with the Egyptian government with the aim of boosting trade, investment, job creation, and industrialization. In Africa as a whole, previous MGI research found that China hired 89 percent of its employees and 44 percent of its managers locally.[5] China is now the largest foreign investor in Africa's telecommunications infrastructure. China has become Latin America's largest creditor through the China Development Bank and Export-Import Bank, and the region's second-largest trading partner. Chinese FDI can be equivalent to as much as 6 percent of domestic investment in some Latin American countries. Chinese capital has largely been used to finance energy and infrastructure projects in the region. China is also investing in smaller developed economies. For instance, in Portugal, Chinese FDI totaled

1 *Resources and Energy Quarterly,* Department of Industry, Innovation and Science and Office of the Chief Economist, Australian government, December 2018.
2 *Chinese education exports reach $10 billion,* Australian Trade and Investment Commission, June 7, 2018.
3 For more on the China-Africa relationship, see *Dance of the lions and dragons: How are Africa and China engaging, and how will the partnership evolve?* McKinsey & Company, June 2017.
4 Heba Saleh, "Egypt sees Chinese investment and tourists as a 'win-win boost," *Financial Times,* October 30, 2018.
5 *Dance of the lions and dragons: How are Africa and China engaging, and how will the partnership evolve?,* McKinsey & Company, June 2017.

€12 billion in November 2018 and has gone to the energy, transportation, insurance, health, financial services, real estate, and media sectors.[1]

Developed economies tend to have lower levels of exposure to China than others
Economic flows with China have increased for most countries since 2003, but developed economies in the West have sufficiently large domestic drivers that they are less exposed to Chinese trade and capital flows. Although the absolute levels of these flows are significant (the United States is China's largest trading partner, and the largest recipient of Chinese outbound FDI, for example), they are equivalent to only 1 to 5 percent of the domestic economy. However, it is important to note that Western developed economies may be exposed to other Chinese flows related to specific segments. For example, education-related spending by Chinese students was $13.9 billion in 2017 in the United States, their largest destination, according to the US Travel Association.[2]

Technology and equipment, resources, and labor-intensive manufacturing sectors are the most exposed to China

44%

of global production of computers and electronics Chinese in 2013–17 vs

21%

in 2003–07

To gauge the exposure of the rest of the world to China at the sector level, we studied 20 primary industries and manufacturing sectors in 73 economies. We analyzed the trade intensity of each of these sectors (measured as total global exports as a share of global gross output), exposure to Chinese exports (Chinese share of global exports), and exposure to Chinese imports (Chinese share of global imports). Although exposure to China has increased in some fashion in all 20 sectors, five distinct sector archetypes emerged, three of which are heavily exposed to China and could face negative consequences from less engagement with this important market (Exhibit 20).

China is integral to global chains for technology and equipment manufacturing
Sectors with many key components and processing steps between R&D, raw material sourcing, and final assembly tend to be highly globalized, with input from multiple countries and firms. Chinese manufacturers often play the role of final assembler in these value chains, although in recent years Chinese firms have moved into higher-value-added activities in many instances. As a result, China's share of production in these sectors is considerable—at least 35 percent of global gross output, and as high as 48 percent in sectors such as electrical equipment. More importantly, trade with China accounts for a significant portion of global output.

Computers and electronics is a pertinent example of a sector in which China has embedded itself deeply into global value chains over the past decade. As in much of manufacturing, China is a significant and growing producer in this sector. Its share of global production grew from 21 percent in 2003 to 2007 to 44 percent in 2013 to 2017. Equally important is China's role as a consumer of computers and electronics. In 2017, China accounted for 40 percent of global sales of mobile phones, and 19 percent of personal computers. Chinese imports of these items accounted for 19 percent of rest-of-world production in the sector (up from 14 percent ten years previously). These statistics clearly indicate the extent to which China has become an integral player throughout the computers and electronics value chain, from being a supplier of raw materials such as rare earths to being an assembler of electrical circuits and components to being the final consumer of these goods.

[1] Philippe Le Corre, "China's golden era in Portugal," *Diplomat,* November 24, 2018.
[2] *International visitations to the U.S. from China 2017, International Inbound Travel Market Profile,* US Travel Association, ustravel.org/system/files/media_root/document/Research_Country-Profile_2017_China.pdf.

Exhibit 20

Technology, labor-intensive tradables, and resource value chains are exposed to trade with China.

Archetype	Sector name	Trade intensity	Chinese share of global exports, %		Chinese share of global imports, %	
			2003–07	2013–17	2003–07	2013–17
High level of integration	Computer, electronic, and optical products		15	28	12	16
	Electrical equipment		16	27	7	9
	Other machinery and equipment		7	17	8	9
High exposure to Chinese exports	Textiles, apparel, and leather		26	40	5	5
	Furniture, safety, fire, other		17	26	2	4
	Other non-metallic mineral products		11	22	5	8
	Rubber and plastics		10	19	5	7
	Basic metals		8	13	8	8
High exposure to Chinese imports	Mining and quarrying		1	1	7	21
	Chemicals		4	9	9	12
	Paper and paper products		3	9	6	12
Global chains with little trade exposure to China	Other transport equipment		3	6	3	5
	Pharmaceuticals		2	4	1	3
	Motor vehicles and trailers		1	3	2	7
	Coke and refined petroleum products		2	4	4	6
Local production for local consumption	Food, beverages and tobacco		3	4	3	6
	Fabricated metal products		14	23	3	5
	Wood and wood products		11	22	2	3
	Printing and media		8	18	2	4
	Agriculture, forestry, and fishing		5	5	7	19

Source: IHS Markit; McKinsey Global Institute analysis

71%

of Pakistan's textiles imports are from China

The world depends on Chinese output in labor- and capital-intensive sectors

China earned its reputation as factory of the world largely because of its prominence in light manufacturing sectors where processing steps are relatively simple. Firms can take advantage of low labor costs in China, although we should note that China has scored significant success in certain heavy manufacturing sectors, too. China's competitive advantage in light manufacturing was already established 15 years ago (for example, Chinese textile and apparel manufacturing accounted for 28 percent of global gross output in 2003 to 2007), but over time, China's scale in these sectors has become even more significant. China's share of global gross output in these sectors can be as high as 53 percent (in textiles and apparel; see below). In many cases, global exposure to Chinese exports can also be high. For instance, Chinese exports amount to 40 percent of global textile and apparel trade and 26 percent of furniture trade. Not all production is exported—a share of production may be used as intermediate goods for further domestic processing. For instance, 49 percent of global nonmetallic minerals are produced in China, but China accounts for 22 percent of global exports.

China's impact as the world's factory is most evident in textiles and apparel. Today, China produces 53 percent of global output in the sector. The sector is also important to Chinese manufacturing more broadly. Textiles and apparel accounts for 14 percent of all Chinese exports, and 32 percent of its output is exported. China's success in the sector partly reflects its scale and relatively low labor costs, which enable it to produce goods at a fraction of the cost of other markets. China's production in this sector has boomed over the past 20 years, while employment in the sector in advanced economies has declined sharply. Between 1998 and 2014, US textiles manufacturing employment fell by 7.6 percent per year, and apparel manufacturing employment fell by 11.2 percent a year. The impact of imports on employment in these subsectors was uneven, however. While imports accounted for only 0.4 percent out of the total 7.6 percent annual decline in employment for textiles manufacturing, they accounted for 10.8 percent of the total 11.2 percent annual decline in apparel manufacturing.[1]

Some signs indicate that the rest of the world's exposure to Chinese production is declining, and that China's role in the overall apparel supply chain is changing. As incomes continue to rise, China's comparative advantage in apparel is being lost to other emerging economies; production capacity and employment are already moving to Bangladesh, Pakistan, and Vietnam, for instance. In 2013, China's exports of apparel accounted for 60 percent of the rest of the world's production, but the proportion has since dropped to 51 percent. A US Fashion Industry Association survey found that, in 2018, China typically accounted for between 11 and 30 percent of apparel companies' total sourcing value, compared with 30 to 50 percent in 2016 to 2017.[2] More recently, China has been playing a more upstream role, supplying textiles to emerging economies. China accounts for 71 percent of Pakistan's textiles imports, 50 percent of Vietnam's, and 47 percent of Bangladesh's.

Input sectors have increased exposure to China as a result of China's industrialization

The growth of China's manufacturing sector has significantly increased its demand for raw materials and intermediate goods that are processed into final goods, and growth in per capita income has increased demand for goods overall in China. Primary industries have been most affected by this growth in Chinese demand. China accounted for only 7 percent of global imports of mining and quarrying products in 2003 to 2007, but by 2013 to 2017 that share had grown to 21 percent. In similar sectors, China can represent about 12 percent of global imports, in addition to domestic production that already accounts for 20 to 35 percent of global gross output.

[1] *Economic impact of trade agreements implemented under trade authorities procedures, 2016 report,* United States International Trade Commission, publication number 4614, investigation number 332-555, June 2016.
[2] Sheng Lu, *2018 fashion industry benchmarking study,* United States Fashion Industry Association, July 2018.

Mining and quarrying is a prime example of a global sector that is highly exposed to Chinese imports. Exposure in this sector is highly geographically concentrated. Countries that have a relatively high endowment of natural resources, such as Australia, Chile, and South Africa, are more susceptible to large resource-related exposure to Chinese imports. Conversely, because Chinese manufacturing depends heavily on output in this sector, China has high exposure to global mining and quarrying supply. Although China's domestic production of iron ore has increased in the past two decades, it has not kept pace with demand for steel, leading to the need to import from countries including Australia and the United States. Mining and quarrying alone now accounts for 28 percent of China's imports.

Exposure to Chinese imports has led to a sensitivity of commodity prices to Chinese demand. For example, one study found that from 2003 to 2012, the most important factor affecting global iron ore prices was China's GDP growth.[1] The significance of Chinese imports in this sector also introduces second-order effects in the transportation sector as the world's freighters need to carry resources for China.

17%

annual growth in Chinese pharmaceutical spending 2010–15

Sectors with strong localization requirements are less exposed to trade with China

Despite relatively high trade intensities in the rest of the world, sectors with limited cross-border flows resulting from localization requirements, either through regulation or businesses deciding to focus on serving local demand, are less exposed to trade with China

Pharmaceuticals is a sector where mutual exposure between China and the world on trade is relatively low. Chinese trade accounts for only 4 percent of global exports and 3 percent of global imports. However, many indirect links make China a significant market and research hub for foreign pharmaceutical firms. Chinese scale in production is sizable, accounting for 25 percent of global gross output from 2013 to 2017, but is largely limited to serving domestic consumption. Domestic consumption is large enough to sustain the Chinese pharmaceutical manufacturing sector. China is second only to the United States in total pharmaceutical spending ($117 billion versus $462 billion in 2017, according to the World Health Organization), and it is also the fastest growing of all large markets, at 17 percent annual growth between 2010 and 2015. Evidence points to further growth potential in this sector in China. Despite being the second-largest market in the world in total pharmaceutical spending, per capita expenditure in China is still factors below that of developed markets. According to data from the World Health Organization, China's per capita pharmaceutical spending reached $426 in 2015, compared with $9,536 in the United States and $4,934 in Australia.

Sectors that are not easily traded have mixed levels of exposure to China

Some sectors produce locally for local consumption. These industries also tend to have low tradability because of the nature of products (agriculture and fishing, food and beverages), a localized production base (fabricated metal products, wood and wood products), and cultural characteristics (printing and media). Growth in Chinese manufacturing scale in these sectors is largely driven by growth in domestic demand, although China can still be a big part of global trade simply because of its scale in some sectors such as fabricated metals.

[1] Linda Wårell, "An analysis of iron ore prices during the latest commodity boom," *Mineral Economics,* May 2018, Volume 31, Issue 1–2.

• • •

China's relative exposure to the rest of the world is declining, reflecting the rebalancing of the economy toward domestic consumption, even while the world's exposure to China continues to rise. Sectors and countries with varying degrees of exposure to China's economy could be more or less vulnerable to a changing relationship between China and the world. Changes in trade, capital, and technology flows could have a substantial impact on supply and demand dynamics as well as economic growth in highly exposed sectors and countries. In the next chapter, we look at the relationship of China and the world on one of the three components of the MGI exposure index: technology.

3 China's technology value chains are globally integrated

Technology is at the center of the changing relationship between China and the world. Due to the complex nature of high-tech industries, technology value chains are inherently global, and China has been a large player in them. For example, China produces 90 percent of the global supply of PCs, 90 percent of mobile phones, and 70 percent of televisions.[1] Because China is deeply integrated in global technology value chains, this is an area where it is particularly exposed to the changing dynamics of global engagement. Continued access to foreign technology can support domestic innovation, but we are seeing increasing barriers to technology flows between China and the rest of the world. The United States, the EU, and Japan have all put in place stricter measures for evaluating Chinese (and other foreign) technology investments. Close attention has been paid to whether China's technology value chains are becoming decoupled from global value chains, and to China's stated aims to localize technology sectors.[2] The Made in China 2025 plan sets targets for local players' market share of 40 to 90 percent in 11 of 23 subsectors prioritized by the government.[3]

In this chapter, we explore China's technology landscape to assess the degree of its integration with global chains, where China stands on developing local supply chains, and what role foreign technologies play in providing core components, finished goods, and technological know-how across value chains.

China is developing considerable local innovation capacity but remains highly integrated in global technology value chains

China is one of the largest consumers of technology in the world. In many types of technology, it is already the largest consumer (for example, China accounted for 40 percent of global mobile phone sales in 2017, more than any other country). Access to the Chinese market has provided many high-tech players with significant growth opportunities. According to an MSCI index, the US information technology sector makes 14 percent of its revenue in China.

1 China's Ministry of Industry and Information Technology.
2 *Made in China 2025 and the future of American industry,* Project for Strong Labor Markets and National Development, US Senate Committee on Small Business & Entrepreneurship, February 2019.
3 *Made in China 2025 key area technology innovation green book,* National Manufacturing Power Building Strategy Advisory Committee, October 2015.

China is also one of the world's most prominent technological innovators. MGI research in 2015 looked at four types of innovation and found that China performs well on customer-focused and efficiency-driven innovation, but it lags behind world leaders on engineering and science-based innovation.[1] China is a global force in the world's digital economy and is building a competitive digital ecosystem (see Box 4, "The competitiveness of China's digital economy").[2] In some technologies, it is catching up rapidly with the world leader. In the supply of AI, the United States leads the world, followed by China. China's government is prioritizing AI through the 13th Five-Year Plan, its Internet Plus and AI plans from 2016 to 2018, and a "new generation AI plan." China has stated that it aims to create a domestic AI market of one trillion renminbi by 2020 and become a world-leading AI center by 2030. Three of China's internet giants—Alibaba, Baidu, and Tencent—as well as iFlytek, a voice recognition specialist, have joined a "national team" to develop AI in in areas such as autonomous vehicles, smart cities, and medical imaging.[3]

1 *The China effect on global innovation,* McKinsey Global Institute, October 2015.
2 *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017.
3 *Artificial intelligence: Implications for China,* McKinsey Global Institute, April 2017; and *Notes from the AI frontier: Modeling the impact of AI on the world economy,* McKinsey Global Institute, September 2018.

Box 4

The competitiveness of China's digital economy

China has developed a rich and dynamic digital economy.[1] It is based on the following three strengths:

— China has a large, young market that enables rapid, large-scale commercialization of digital business models. In 2018, China had more than 800 million internet users, more than the EU and the United States combined, and 95 percent of users accessed the internet via mobile. Nearly one in five internet users in China relies exclusively on mobile, compared with just 5 percent in the United States, and the mobile share of e-commerce sales in China is around 70 percent, compared with 30 percent in the United States. China's share of internet users making mobile digital payments is around 68 percent versus 15 percent in the United States.

— China is developing a rich digital ecosystem around its three internet giants: Baidu, Alibaba, and Tencent, popularly referred to as BAT. All three have built strong market positions by taking out inefficient, fragmented, and low-quality offline markets. They all began with a core offering and then diversified. Alibaba's Alipay and Tencent's WeChat now offer "superapps" that give consumers a one-stop shop where they can make transactions in education, health, information services, entertainment, e-commerce, and social media. The BAT companies have fueled growth, providing 42 percent of Chinese venture-capital investment in 2016. One in five top Chinese startups was founded by BAT or BAT alumni, and an additional 30 percent receive funding from BAT firms. Now China's digital ecosystem is growing well beyond the big three; indeed, new players such as Pinduoduo and Bytedance are challenging BAT. Large incumbents such as Ping An and Huawei are also building their own ecosystems that go beyond their traditional industries.

— The Chinese government held off regulating the digital sector until digital players had time to experiment. Regulators set a cap on the value of online money transfers 11 years after Alipay introduced them in 2005. Today, the government actively supports growth in the digital ecosystem by, for instance, building world-class infrastructure.

MGI research in 2017 found that three digital forces—disintermediation, disaggregation, and dematerialization—could potentially shift (and create) 10 to 45 percent of industry revenue pools by 2030, reshaping value chains and boosting productivity.

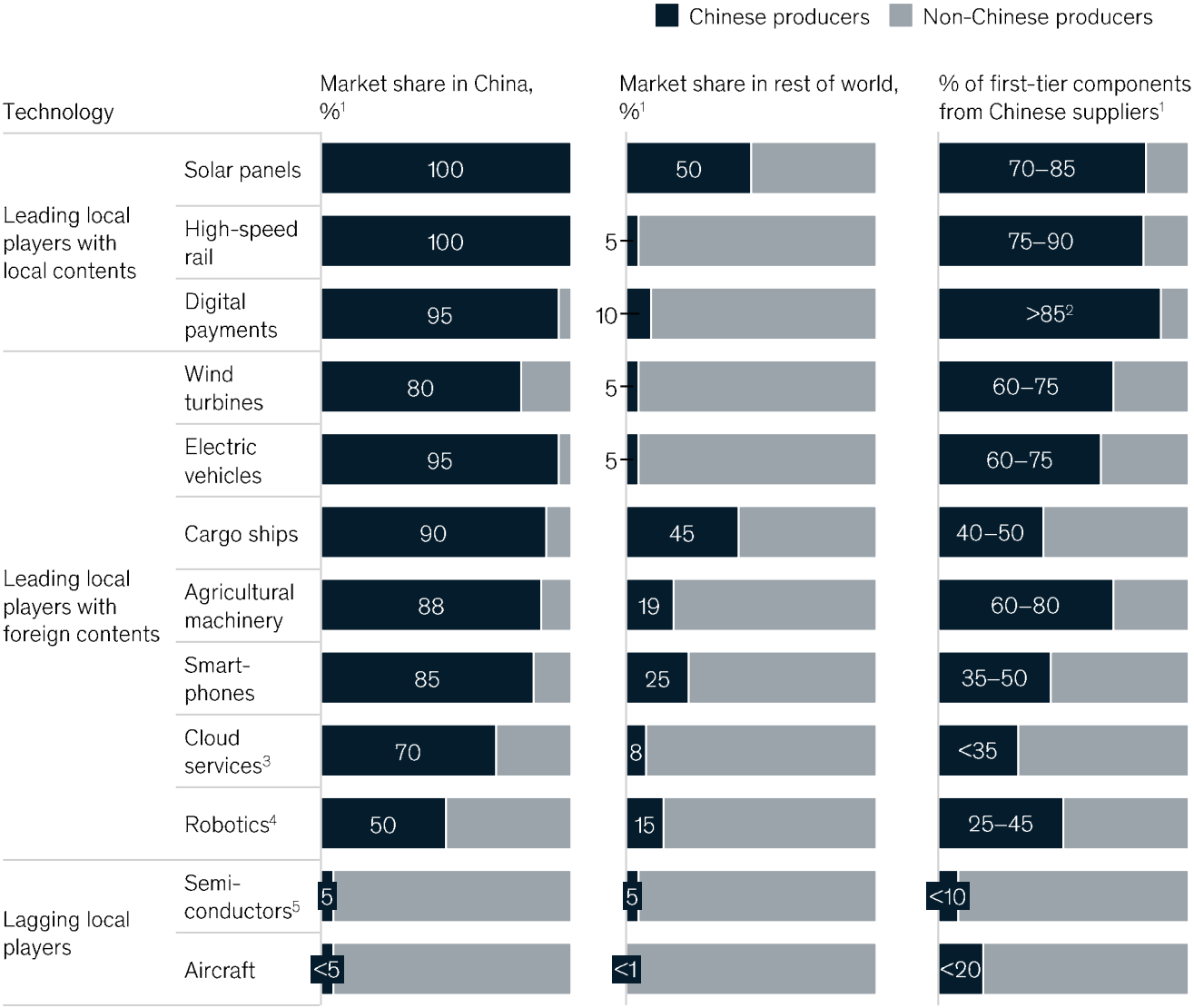
1 *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017.

The degree of localization varies greatly depending on the technology. MGI looked at 12 technology sectors and analyzed their shares of Chinese producers in the domestic market, market shares of the rest of the world, and shares of domestic value chains captured by Chinese suppliers at the level of first-tier components (Exhibit 21).

In three cases (solar panels, high-speed rail, and digital payments), Chinese suppliers accounted for significant shares of both the domestic market and overall value chain, with domestic suppliers supplying more than 70 percent of total value. In seven cases, Chinese suppliers accounted for a significant share of the domestic market but still relied on imports for a large share of components. For instance, Chinese smartphone manufacturers account for more than 85 percent of the domestic market, but more than 50 percent of components are sourced from multinational players. Finally, in two of the technologies (semiconductors and aircraft), Chinese suppliers account for a small share of the domestic market and rely heavily on foreign products.

Exhibit 21

Chinese technology producers have gained market share in key subsegments but still rely on global value chains for inputs.



[1] Based on 2018 or the latest available data.
[2] Compares local vs imported software development costs.
[3] Servers used for cloud storage purposes.
[4] Captures only industrial robots.
[5] China and rest-of-world market shares assumed to be equal due to data availability.

Source: Annual reports; literature search; McKinsey Global Institute analysis

In almost all technologies studied, outside its domestic market China's value chains are relatively limited. With the exception of solar panels and cargo ships, in which Chinese manufacturing can account for up to half of the rest-of-world market, the share of Chinese players is consistently below 25 percent of the market outside China.

To assess China's integration with global technological standards, MGI looked at 81 technologies in 11 manufacturing and services industries, and compared mainstream applications used in China versus in the rest of the world (Exhibit 22). In more than 90 percent of the cases, China has followed global standards for mainstream applications (see the technical appendix for full details). Two examples stood out as areas where China has deviated from global incumbents. First, in digital payments, China opts for QR codes, which are easier and cheaper to generate compared with the near field communication (NFC) scanners more commonly seen elsewhere. Second, in PVC manufacturing, China uses a coal-based production method instead of the ethylene-based method more common in other countries because of its abundance of coal. It is important to note that in both of these examples, the alternatives provided by global standards (NFC scanners and ethylene-based PVC manufacturing) are also available in China, although not on the scale of mainstream applications.

China follows global standards for mainstream applications in

>90%

of cases studied

We also found that Chinese suppliers can provide 60 to 80 percent of the technologies studied, which means that China still uses inputs from multinational corporations in at least 20 to 40 percent of cases.

Finally, our analysis finds that Chinese suppliers may match or surpass global leaders in performance metrics in only 40 to 60 percent of technologies, pointing to a gap between the performance of leading Chinese providers and their counterparts in the rest of the world. Catching up is possible—and indeed has happened in other industries. For instance, China closed the gap with foreign technological leaders in upstream industries such as mining, where a long history of development provided ample time to catch up, and in low-complexity technologies such as smartphone assembly where technological barriers are relatively low. The largest performance gaps between Chinese and foreign players are in relatively new and high-complexity sectors such as integrated circuits.

MGI also studied emerging technologies in AI, quantum computing, genomics, telecommunications, and space discovery. In these areas, a global standard has not yet been established because value chains are at an early stage in their development, and China is making a significant contribution. For example, China already utilizes advanced AI in facial recognition systems. In early 2019, its Chang'e space rover was the world's first to land on the far side of the moon. However, in each of these cases, China benefits from access to foreign components, investment, and talent.

China is likely to be the first nation to launch a 5G telecommunications network at scale, and it is playing a significant role in setting the global standard. This reflects the fact that China holds 10 percent of the patents for 5G technologies, which is a much higher share than was the case with 3G or 4G at a comparable stage in their development. Eventually, China may have 30 percent of global 5G-related patents according to one estimate.[1] China has also been participating actively in the Institute of Electrical and Electronics Engineers and other international standards-setting bodies.

[1] *The geopolitics of 5G,* Eurasia Group, November 5, 2018.

Exhibit 22

China has integrated with global standards for most technologies and is showing different technology localization across value chains.

	Areas/sectors	Techno-logies reviewed	Share using global standard[1]	Share that has local provider[1]	Share where Chinese companies technically provide better than or on par with global leader[1]
Basic materials	• Mining • Steel	7			
Chemicals	• Oil and gas • Commodity and specialty chemicals • Textiles	12			
Components	• Display • Integrated circuits	8			
Electric vehicles	• Battery electric vehicles • PHEVs	7			
Transportation	• High-speed rail • Marines	10			
Consumer electronics and internet	• Consumer electronics • Digital payments • Drones	11			
Equipment	• Surgical robots • Industrial robots	4			
Pharmaceuticals and biotech	• Small-molecule drugs • Biomolecule drugs	6			
Artificial intelligence	• Speech recognition • Facial recognition • Autonomous driving	5			
Next-generation technologies	• Quantum technology • 5G • Space	8			
Genomics	• Genotyping • Gene sequencing • Gene editing	3			
Total		81	>90%	60–80%	40–60%

[1] We estimated "share using global standard" by identifying key technologies in different areas and assessing whether China utilizes the same technical standards and processes that are most commonly used outside China. We assessed "share that has local supplier" by analyzing whether Chinese companies have a presence among global suppliers for each key technology. We analyzed the "share that is better than it on par" by defining specific performance indicators and whether local Chinese suppliers are able to deliver technical outcomes that are better, or on par with, incumbents outside China.

Source: Literature search; expert interviews; McKinsey Global Institute analysis

Four elements need to be in place to move up the technology value chain, and further integration can help

Developing certain technologies and achieving global scale can take between ten and 20 years (Exhibit 23). In several cases, countries were successful in moving up the technology value chain and becoming industry leaders over a similar time frame. After World War II, Japanese automakers resumed production of passenger cars in 1953 with basic, low-end technology and overtook Western companies in the global market. Subsequently the industry moved up the technology value chain, and by 1967 Japan was the world's second-largest automaker. Taiwan began integrated circuit design in 1975 under government sponsorship, and the top three PC chip-set providers had achieved more than 50 percent of global market share in 1999.[1] It took only 15 years from when South Korean conglomerates started producing memory chips for the country to become the world's largest producer, with a 40 percent global market share. Israel set a strategic direction for technological progress in life sciences in the 1990s, and by 2012 ranked first in the world for patents per capita in medical devices.

Two examples in China stand out. Chinese companies became the world's second-largest group of LCD panel makers in 2016, only 13 years after starting production and five years after China identified LCD as a strategically important industry. In the case of high-speed rail, China announced a strategic plan for the sector in 2004, signing a number of contracts with multinational corporations that gave it an access point to the necessary technology. By 2017, China was producing its own locally designed and much-improved technology, and its Fuxing bullet train was in operation.[2]

Experience from around the world suggests that four elements need to be in place to move up the technology value chain: (1) investment at scale; (2) channels through which to acquire technology and know-how; (3) access to large markets; and (4) an effective system to encourage competition and innovation. In almost all technology value chains, China has substantial scale in investment (the first element) and markets (the third element). China has the capacity to support a great deal of investment in technological R&D and create new markets to commercialize the technologies.[3] The huge scale of China's internet user base, for instance, encourages continuous experimentation and enables digital players to achieve economies of scale quickly. Moreover, Chinese consumers eagerly embrace new technologies, as evidenced by the explosive growth of mobile payment systems, ride sharing, and dockless bike rentals.

Therefore, the critical ways for China to move up the value chain are to make progress on developing and acquiring core technology and know-how (the second element) and designing an effective system to ensure that its ecosystem has the competitive dynamics to fuel innovation (the fourth element). Participation in global value chains is a helpful way for China to make continued progress on the two elements.

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1 Pao-Long Chang and Xhien-Tzu Tsai, *Finding the niche position—competition strategy of Taiwan's IC design industry,* Technovation 22, 2002.

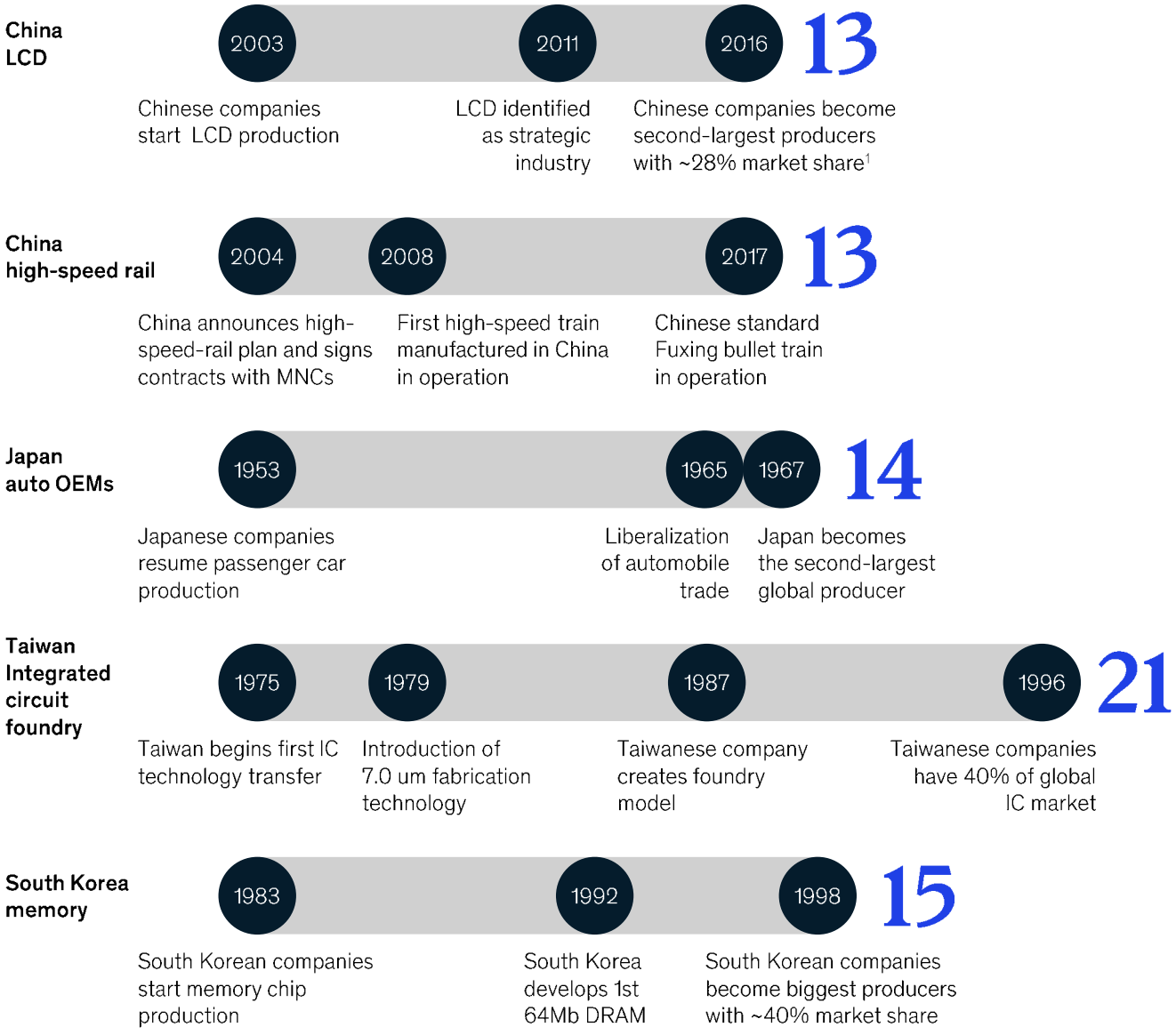
2 "'Fuxing" bullet train to be put into operation in N China," *China Daily,* August 17, 2018.

3 China's growing venture capital industry is increasingly focused on digital, and China is in the worldwide top three for venture-capital investment in key technologies including virtual reality, autonomous vehicles, 3-D printing, robotics and drones, and AI. See *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017.

Exhibit 23

Several examples of technological catch-up unfolded over the course of ten to 20 years, including in China.

Years to become a leading industry player (by company HQ)



[1] Based on total market shares of two Chinese companies: BOE Global and BOE and China Star Optoelectronics Technology.

Source: Literature search; McKinsey Global Institute analysis

Investment at scale needs to precede the development of technologies and innovation, and be sustained

Investment can be used to develop and acquire technologies, build capacity, and create new markets. Between 1980 and 2000, Japan was the largest investor in the auto industry at $570 billion (compared with $414 billion in the United States), accounting for 31 percent of global investment in the sector.[1] South Korea's semiconductor companies made bold investments early on, aided by the ability of conglomerates to cross-finance within their organizations to support the development of new businesses and carry financial losses in the first three to five years after they entered the memory industry. Taiwan invested $670 million on upgrading from 7 um to 3 um semiconductor technology between 1979 and 1983, $245 million to upgrade from 3 um to 1 um in 1983 to 1988, and $7 billion on developing submicron technology in 1990 to 1995 to keep pace with upgrades in the industry.[2] The Industrial Technology Research Institute of Taiwan played a significant role in this effort, overseeing technology transfer and leading by developing a consortium for companies to codevelop new early-stage technologies.

>50%

of new global capacity in thin film transistor LCD manufacturing in China 2012–14

In China, investment has poured into the LCD sector since the government designated it a strategic industry and set a target of achieving 500 billion renminbi revenue from the LCD value chain in 2011. Between 2012 and 2014, China accounted for more than 50 percent of global new capacity in thin film transistor LCD manufacturing, according to IHS Markit data. In high-speed rail, China invested about $880 billion on new projects up to 2016.[3] This stimulated the domestic market, sustaining production capacity and enabling the industry to finance R&D.

Acquiring technology is vital given the high-tech complexity of the components, software, and hardware needed for manufacturing

Experience from other countries suggests that good access to advanced technologies often provides a quicker path than developing the economy's own capabilities in key technologies from scratch (see Box 5, "Past attempts to indigenize technology have tended to fail"). Mergers and acquisitions, technology transfer from multinational corporations, acquiring talent, and licensing have commonly and successfully been used in many other economies. In South Korea, memory companies acquired initial design and process technology from licensing and OEMs.[4] It signed 101 technology licenses between 1983 and 1988.[5] Memory companies benefited from both knowledge and talent flows. For instance, Samsung used its center in San Jose, California, as a "transition point" to attract senior and experienced South Korean engineers, and dispatched young talent from South Korea to Silicon Valley to work with them.[6]

Access to foreign technology also played an important role in China's development of the LCD and high-speed rail industries. All of the top three Chinese LCD panel makers acquired leading technology through acquisition and cooperation with South Korean and Japanese multinational corporations between 2003 and 2011. For instance, BOE acquired its thin film transistor LCD business from Hydis (Hyundai) in 2003.[7] TCL (whose display panel business became CSOT) built its LCD fabs in 2007 with technical support from Samsung through an outsourcing agreement.[8] In high-speed rail, four global leaders collaborated with China on first-generation codevelopment, providing manufacturing specification and process and engineer training through a technology transfer agreement that ran from 2004 to 2007.[9]

1 IHS Markit.
2 Pao-Long Chang and Chiung-Wen Hsu, "The development strategies for Taiwan's semiconductor industry," *IEEE Transactions on Engineering Management,* November 1998, Volume 45, Issue 4.
3 *2016 China's high-speed rail industry development trends and vehicle demand budget, China Industry Information Network,* September 21, 2016, chyxx.com/industry/201609/450585.html.
4 S. Ran Kim, "The Korean system of innovation and the semiconductor industry: A governance perspective," *Industrial and Corporate Change,* June 1998, Volume 7, Issue 2.
5 Jaeyong Song, *Technological catching-up of Korea and Taiwan In the global semiconductor industry: A study of modes of technology sourcing,* discussion paper number 15, APEC Study Center, Columbia Business School, December 2000.
6 David Mushkudiani, *The Korean semiconductor industry: Historical overview and prospects for future development,* 2000.
7 Mark O'Neill, "China imports hi-tech through Hydis purchase," *South China Morning Post,* February 20, 2003.
8 "Samsung to outsource some work to China's TCL," Reuters, April 29, 2008.
9 Jue Wang and Qing Wang, *China's high-speed rail: From technological catching-up to innovation,* Renmin University of China, November 2017.

Box 5

Past attempts to indigenize technology have tended to fail

Several economies have attempted to move away from a globalized model toward an approach that prioritizes domestic industries by substituting foreign imports with domestically produced goods. However, in most cases domestic producers have proved unable to compete with low prices that importers can offer, leading to high levels of government intervention in the form of tariffs on imports or subsidies for domestic producers and increased prices for downstream consumers.

One example is the import-substitution-based industrialization strategy pursued in Latin America beginning in the 1930s.[1] Fearing volatility associated with dependence on foreign imports, Latin American countries strived to indigenize domestic production as a way of industrializing their economies, imposing tariffs on imports and offering subsidies for domestic firms. These policies successfully boosted domestic production in light industries, but they led to higher imports of capital needed to sustain growth in these sectors. Furthermore, as heavy manufacturing sectors began to industrialize, the same benefits from import substitution could not be realized because of the complexity of advanced manufacturing.

A different take on import substitution is a strategy that aims to indigenize all parts of a technology value chain. However, experience tells us that it is very hard for any economy to access the cutting-edge technology it needs purely from within. Take as an example the United States Department of Defense's Very High Speed Integrated Circuit (VHSIC) program, which began in 1979 as a way to boost production of integrated circuits for military applications. As part of this program, the government attempted to require that every piece of semiconductor processing equipment used to make military integrated circuits have at least one US source. However, the program was abandoned because, in practice, the complexity of the manufacturing process was too great to support this approach.[2] Although the program was successful in delivering higher-performance semiconductors, costs ballooned from an estimated $200 million to more than $1 billion.[3]

Another example is the Soviet Union's attempt to create its own internet in parallel with the US internet ecosystem. Although the Soviet Union was initially successful at creating a network of computers that were able to communicate with one another, further investment and effective competition were needed to create a fully functioning internet ecosystem. In the end, lack of regulated competition in the development of cybernetics and institutional infighting for financial resources led to the program's failure. [4]

1 Guillermo Rozenwurcel, *Why have all development strategies failed in Latin America?*, United Nations University-WIDER, research paper number 2006/012, 2006.
2 *Without technology, China's 'MIC 2025' to fall short of its goals,* Evertiq, February 13, 2017.
3 Anna Slomovic, *Anteing up: The government's changing role in the microelectronics industry,* The RAND Corporation, December 1988, apps.dtic.mil/dtic/tr/fulltext/u2/a228267.pdf.
4 Benjamin Peters, *How Not to Network a Nation: The Uneasy History of the Soviet Internet,* Cambridge, MA: MIT Press, 2016.

Experience shows that a sizable local sector can emerge only if there is a large market for its output

Access to large markets is vital. Those markets can either be domestic or global, and in the cases of most economies that have caught up with global technology standards, the domestic market is insufficient to support local manufacturers. Access to an export market is necessary. South Korean and Taiwanese memory players accessed large markets by going global because their domestic markets were small. According to one study, of South Korea's $8.5 million semiconductor production in 1994, 90 percent was exported to other countries.[1] Furthermore, even the estimated 10 percent that is captured by domestic demand may end up as exports in the form of finished high-tech products such as televisions, computers, and mobile phones. Similarly, Taiwanese companies aggressively tapped into global demand. Semiconductor sales total over $80 billion a year and account for 40 percent of Taiwan's total exports.[2] To service the global market, Taiwanese firms have also set up factories overseas. For example, four out of the Taiwan Semiconductor Manufacturing Company's 13 front-end fab facilities are outside Taiwan; half are located in China. In practical terms, access to a large market, whether local or global, was a driving factor behind these countries' technological catch-up.

65%

of global high-speed-rail mileage in operation is in China

Unlike smaller economies that have to rely on export volumes to reach scale in high-tech manufacturing, China has benefited from its large and fast-growing domestic economy. China is already the biggest producer of consumer electronics such as televisions and smartphones that consume about 90 percent of domestically produced LCD panels. Chinese companies' market shares in televisions and smartphones are around 27 percent and 28 percent of the global total, respectively.[3] While China's domestic market is large enough to support local players, they have also begun to tap into export markets in certain sectors. In consumer electronics and computers (LCD-enabled products), 28 and 39 percent of production is exported, respectively. In other high-tech segments, the domestic market alone is sufficient to support domestic players. China constructed 20,000 kilometers of high-speed rail between 2004 and 2016, accounting for 65 percent of the world's total mileage in operation.[4] Exports so far have been limited, but discussions are under way regarding the export of China's technology to other emerging markets like Indonesia and Thailand.[5]

Facilitating healthy competition and constantly setting a high bar for innovation are critical for the development of technology

Economies around the world have relied on the power of the private sector to drive competition, sometimes defining specific performance goals in order to obtain continued support from government. Japan limited imports of foreign cars and offered incentives for the export of vehicles produced domestically (in the form of low-interest loans, reduced taxes, and subsidies, for instance) until 1965 because more than six major domestic automakers including Nissan and Toyota—largely private companies—were creating sufficient competition to ensure a high degree of innovation. These companies were given time to prepare for the international competition that came with the liberalization of automobile trade; a ten-year timeline was agreed upon when Japan joined the General Agreement on Tariffs and Trade in 1955.[6]

1 S. Ran Kim, "The Korean system of innovation and the semiconductor industry: A governance perspective," *Industrial and Corporate Change,* June 1998, Volume 7, Issue 2.
2 *Taiwan—semiconductor equipment, Taiwan Country Commercial Guide,* International Trade Administration, US Department of Commerce, October 10, 2018, export.gov/article?id=Taiwan-Semiconductor-Manufacturing-Equipment.
3 Ammar Arshad and Rashad Yazdanifard, "Investigative synopsis of Sony Inc.'s strategic management issues / failures and how to overcome them," *International Journal of Management, Accounting and Economics,* September 2017, Volume 4, Number 9.
4 *2016 Chinese high-speed rail industrial development trends and forecast,* September 21, 2016, chyxx.com/industry/201609/450585.html.
5 Robin Spiess, "Work starts on Chinese-funded Indonesian high-speed railway," *Southeast Asia Globe,* July 10, 2018; and "Construction of Thai-Chinese high-speed rail to start fully next year: Thai official," *China Daily,* June 3, 2018.
6 David Flath, *A perspective on Japanese trade policy and Japan-US trade friction,* Columbia University Graduate School of Business, Center on Japanese Economy and Business working paper number 151, October 1998.

China's LCD industry has benefited from competition among local private companies and with multinational corporations. Televisions and smartphones—the downstream of this industry—are commoditized and cost sensitive, and competition is fierce in both performance and cost efficiency. In the high-speed rail industry, among 33 local enterprises (formerly part of China Northern Locomotive & Rolling Stock Industry Corporation and China South Locomotive & Rolling Stock Corporation) spread over 25 cities, four companies were chosen to localize production and know-how from four multinational corporations, putting in place de facto internal competition.[1]

The presence of more foreign firms and market-based competition is likely to create a higher degree of healthy pressure on and among local players. In particular, SOEs have more room to raise their efficiency and undertake innovation to enhance their long-term competitiveness. SOEs, which are major players in certain high-tech sectors in China, have been shown to deliver 45 percent lower financial returns, invest 40 percent less in R&D, and be 30 percent less effective at innovating than their private counterparts.[2] Implementing a performance-based management system and promoting healthy competition among private companies and with SOEs could help facilitate more innovation.

>75%

share of China's EV market held by the top 9 Chinese OEMs

Three technology segments illustrate different positions in global technology value chains

In the rest of this chapter, we look more closely at three key sectors—EVs, robotics, and semiconductors—to explore where China stands on local capacity and integration in global value chains.

EVs: China has expanded its domestic industry and is now showing signs of greater global integration

China has demonstrated success in developing its electric vehicle market. The country produced more than a million EVs in 2018, up from 22,978 in 2013—116 percent annual growth. This makes China's EV market the largest in the world, according to IHS Markit data. In battery electric vehicles, the top nine Chinese OEMs have more than a 75 percent share of the domestic market (Exhibit 24). Chinese companies also largely produce the major components of Chinese EVs, including batteries and power trains, which together account for about 60 percent of the overall cost.

That's not to say that China has indigenized the entire EV value chain. It still relies on foreign inputs for core components, including microcontroller units and insulated-gate bipolar transistor-based power modules (Exhibit 25). Moreover, Chinese batteries have some performance gaps. Batteries from leading Chinese manufacturers lag behind those produced by Japanese and South Korean leaders by 30 to 40 percent in density and therefore EV performance.[3] The driving range of the leading Chinese EV is some 40 percent shorter than that of the leading US EV.[4] Still, the size of today's China's EV industry is impressive by global standards.

1 Jue Wang and Qing Wang, *China's high-speed rail: From technological catching-up to innovation,* Renmin University of China, ebha.org/public/C7:paper_file:79.
2 John Wu, *Despite China favoring state-owned enterprises, its private companies are more innovative and productive,* Information Technology and Innovation Foundation, November 29, 2016.
3 Trefor Moss, "China's road to electric-car domination is driven in part by batteries," *Wall Street Journal,* October 21, 2017.
4 Heejung Jung, Rebecca Silva, and Michael Han, "Scaling trends of electric vehicle performance: Driving range, fuel economy, peak power output, and temperature effect," *World Electric Vehicle Journal,* November 2018, Volume 9, Issue 4.

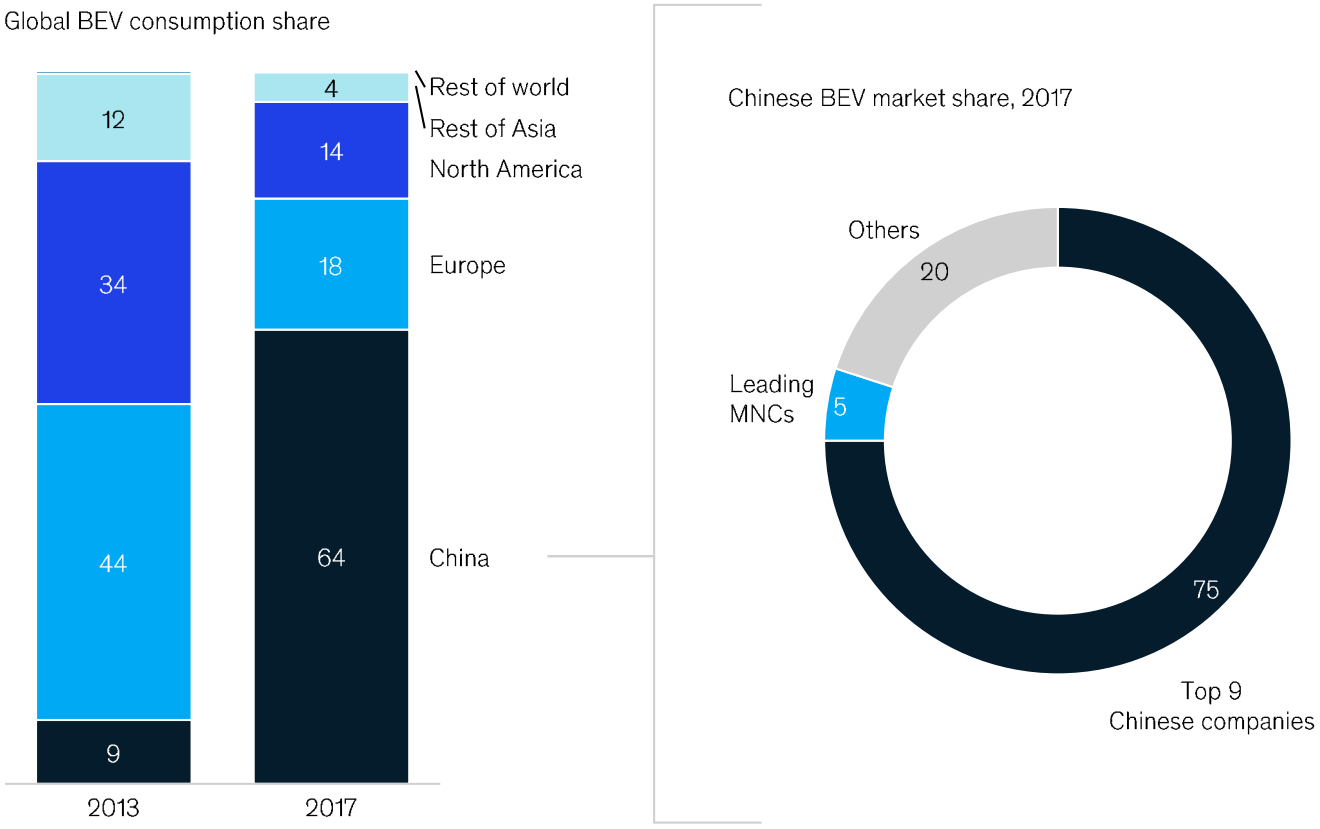
Driving rapid growth of China's EV sector was substantial investment (the first of the four elements we have described) and government support that led to the creation of a large market (the third element). The Chinese government spent $1 billion on EVs and hybrid EVs (HEVs) in 2017.[1] Chinese monetary subsidies for a midsize car amount to some 23 percent of the total price (lower than in Denmark at 49 percent and Norway at 45 percent, but higher than in the United States at 18 percent, Germany at 13 percent, and Japan at 10 percent).[2] Infrastructure investment has also been rising to support EVs. For instance, privately owned charging stations jumped from only 76 stations in 2010 to 6,900 in 2017—compound annual growth of 190 percent. Between 2010 and 2017, the number of public charging stations soared from 1,122 to 230,000, compound annual growth of more than 200 percent.[3]

[1] Kyle Hyatt, *China may slash EV purchase subsidies, but why?* CNET, July 9, 2018.
[2] Patrick Hertzke, Nicolai Müller, and Stephanie Schenk, "China's electric-vehicle market plugs in," *McKinsey Quarterly,* July 2017.
[3] *China's EV charging station and charging pile market report, 2018–2025,* Research in China, August 2018, researchandmarkets.com/research/xvn269/china_ev_charging?w=5

Exhibit 24

Chinese manufacturers account for the majority of the domestic battery electric vehicle market.

%



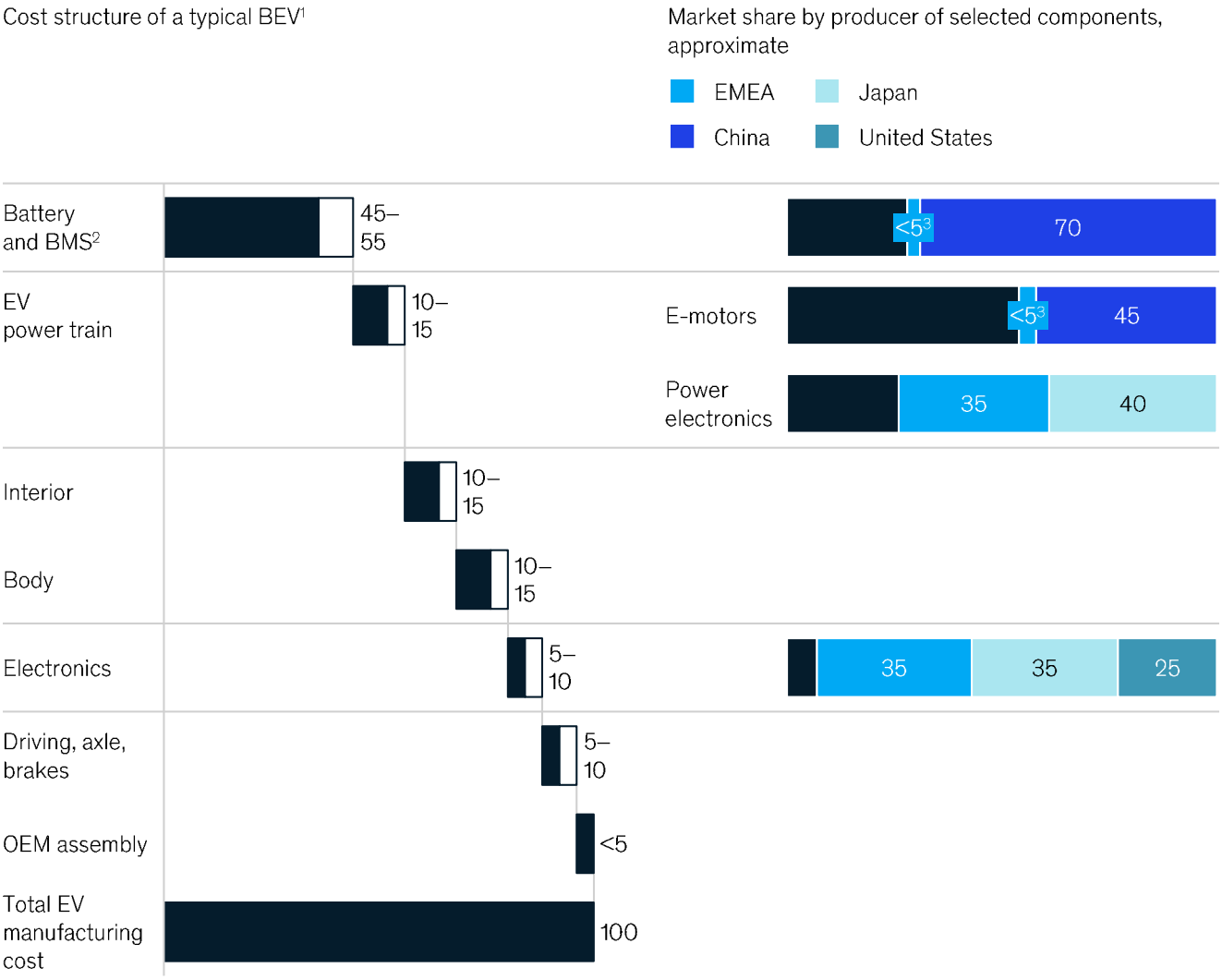
Note: Figures may not sum to 100% because of rounding.

Source: IHS Markit; CAAM; McKinsey Global Institute analysis

Exhibit 25

China is dependent on global supply for some key components in electric vehicles.

%



[1] Based on three popular BEV models.
[2] Battery management system.
[3] Joint venture with Chinese partner.
Note: Figures may not sum to 100% because of rounding.

Source: Shenzhen Gaogong Industry Research; literature search; McKinsey Global Institute analysis

The government also became a major EV customer. Sales of electric buses grew from just 1,000 units in 2011 to 116,000 in 2016.[1] The government identified Shenzhen as the ideal city to pioneer all-electric bus fleets, and it is now the only city in the world with an entirely electric fleet. From 2013 onward, the government has offered subsidies of $72,000 a year for every EV Shenzhen's public-bus operator runs. Since then, the city's fleet of 16,000 electric buses has cost the government more than $1 billion a year.[2]

[1] Tim Dixon, *China 100% electric bus sales "just" 89,546 in 2017,* Clean Technica, February 4, 2018.
[2] Daniel Ren, "Shenzhen's all-electric bus fleet is a world's first that comes with massive government funding," *South China Morning Post,* October 23, 2018.

The government has also boosted the sector's development through regulation. In 2017, for instance, it introduced green license plates for new energy vehicles across the country, giving owners preferential treatment. By 2025, Chinese leaders aim to have seven million plug-in hybrid or battery-powered cars (battery EVs or BEVs) sold per year.[1] In addition, China appears to be developing a long-term plan to stop producing vehicles powered by fossil fuels. A new EV policy due to come into force in 2019 requires automakers to comply with a mandatory EV credit target. With these forces in place, China is likely to continue the momentum of rapid EV market growth.

Some evidence indicates that not all of these interventions have produced the desired results. Although the number of charging stations has increased dramatically in recent years, utilization is still only 15 percent, according to one estimate.[2] Drivers have noted low technological quality (leading to longer charging times) and lack of industry-wide coordination as factors deterring them from using publicly available charging stations. Certainly, lack of standardization in the domestic industry appears to have had an impact on the safety and cost-efficiency of EVs. One report estimates that in 2018 alone, China had to dispose of 170,000 tonnes of spent EV batteries as a result.[3]

>75%

of global EV sales growth 2013–17 from China

China now appears to be opening its large EV industry more to foreign players, and has announced plans to enhance the competitiveness of the local EV industry. This could be a significant opportunity. China accounted for 75 percent of global EV sales growth in 2013 to 2017, and China can become a global growth engine for multinational corporations operating in this sector. China not only is the largest EV market in the world, but is also projected to be the fastest growing.

Candidates for government subsidies were restricted to locally produced vehicles including by foreign joint ventures.[4] However, EV subsidies are expected to decline by 30 percent in 2019 and end completely by 2020, which may mean that local players will need to compete based on the performance of components and vehicles. The plan also includes relaxing joint venture requirements, which may allow foreign players to set up wholly owned subsidiaries in China. This government initiative has led to some international OEMs announcing new joint ventures with domestic Chinese brands and expanding existing stakes in current joint ventures to coproduce EVs.[5] Tesla began construction of its Shanghai Gigafactory at the start of 2019. Since 2017, Ford has established two joint ventures with local partner Zotye to develop affordable EVs and provide ride-hailing solutions to Chinese cities.

Measures to relax restrictions on foreign players in China's EV market are welcome, but more can be done to remove existing operational barriers in the auto industry. Some foreign OEMs have announced plans to increase their stakes in existing joint ventures following changes to regulatory requirements, but the process of dissolving joint ventures will require detailed coordination with local partners and regulators at the operational level. Other requirements and considerations, such as China's carbon credit system, can also cause concern for foreign manufacturers who have not yet built an EV facility at scale.[6]

Robotics: China still depends on foreign OEMs on core components and high-end products, but local producers have gained competitiveness in certain subsectors

China is the largest robotics market in the world, accounting for 36 percent of total industrial robot unit sales in 2017, according to the International Federation of Robotics. However, the performance of Chinese OEMs has been mixed. Overall, foreign players still control a large share of robotics and components manufacturing, although Chinese companies have made progress. Chinese players have begun to benefit from the scale of the country's manufacturing sector and large unmet demand for industrial robotics as well as increased consumer demand for service robotics.

1 "China is leading the world to an electric car future," Bloomberg News, November 14, 2018.
2 Xiao Ying and Teng Jing Xuan, "China's electric vehicle charging stations idle 85% of time," Caixin, January 22, 2018.
3 "China draws up plans to promote standardization in electric vehicles," Reuters, March 27, 2018.
4 *Supercharging the development of electric vehicles in China,* McKinsey & Company, April 2015.
5 Jack Perkowski, "What the BMW deal means for the future of auto joint ventures in China," *Forbes,* November 2, 2018; and Kevin Buckland, "Chinese carmakers under pressure as joint-venture caps eased," Bloomberg News, April 18, 2018.
6 Yang Jian, "Don't bet on widespread breakups of JVs in China," *Automotive News,* April 23, 2018.

36%

of global industrial robotics order from China in 2017 vs

21%

in 2013

In industrial robotics, China was the world's largest purchaser in 2017 with 36 percent of all global orders, up from 21 percent in 2013. The share of domestic sales commanded by Chinese OEMs rose from 25 percent in 2013 to an estimated 45 percent in 2017 (31 percent excluding KUKA). Chinese firms have made the most headway in small-scale, low-complexity applications (Exhibit 26). Within the domestic market for industrial robotics, Chinese OEMs are major players in the manufacture of soldering and measurement robots, and they have more than a 50 percent share in dispensing, palletizing, plastic molding, and metal casting robots. However, the market sizes for these robot applications are typically small (fewer than 20,000 sold per year), and demand outside China tends to be limited. Furthermore, these robot applications are typically low in complexity, able to replace one industrial full-time equivalent job at most. Chinese suppliers still lack scale in the domestic markets for material handling (8 percent market share), welding (10 percent), and assembly robots (11 percent), which are the three largest applications both globally and in China. These are also the most complex robots, being able to replace up to three industrial full-time equivalent jobs.

In service robotics, the Chinese market has kept pace with the rapid growth in demand observed in the rest of the world. Consider that, compared with the United States, China delivers 50 percent more e-commerce packages, has 13 times the number of restaurants, and has triple the elderly population—e-commerce, restaurants, and the elderly are all significant target markets for service robots. One of the largest applications in service robotics is the automated guided vehicle, and Chinese players dominate the local market with a market share of around 90 percent. Leading Chinese player SIASUN has forged ahead by providing end-to-end automation support ranging from industrial robotics to warehouse and logistics automation to system integration, and by focusing heavily on R&D, which employs three-quarters of its 1,600-strong workforce.

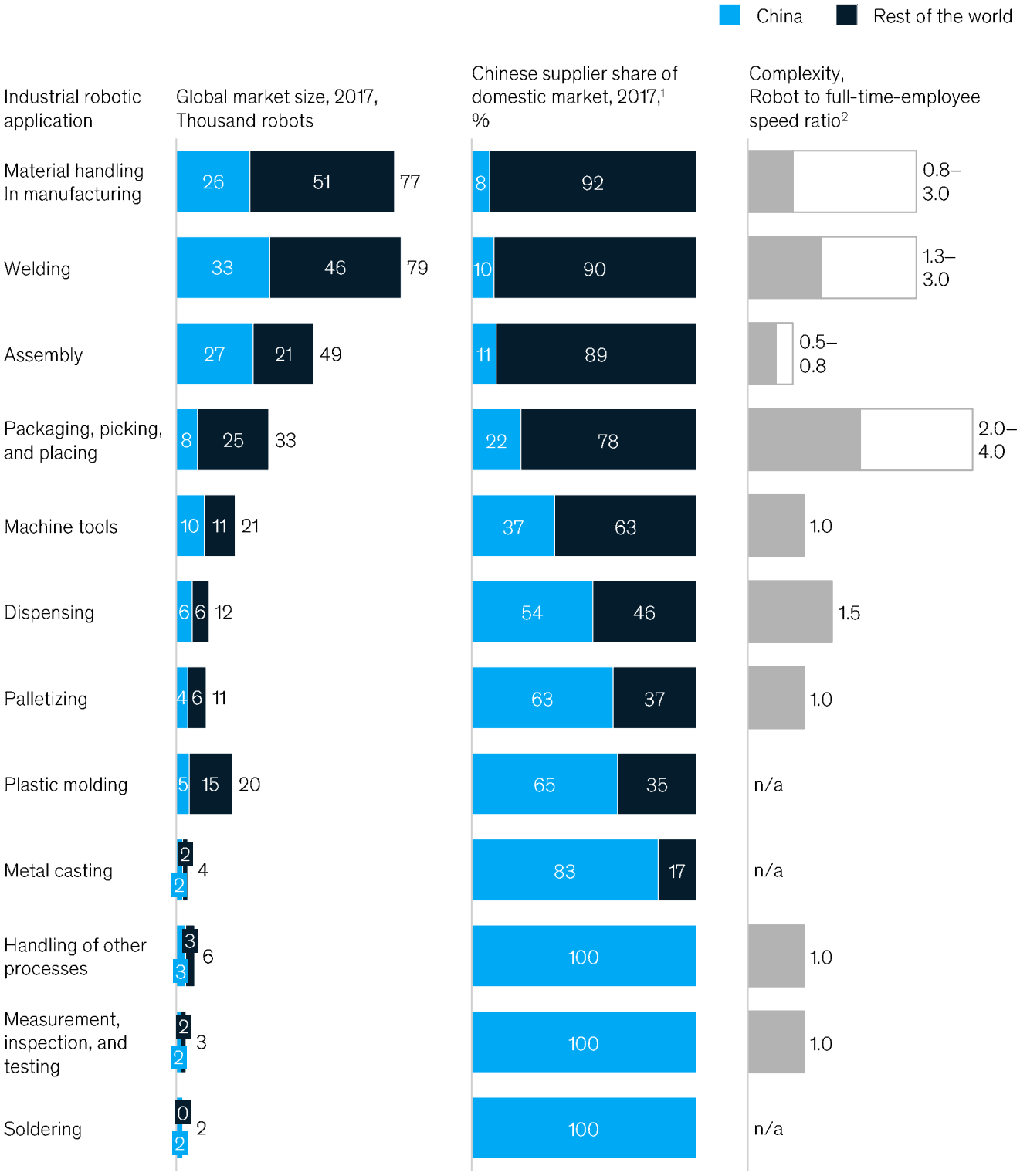
Any attempt to indigenize the full value chain involves high barriers. While manufacturing commodity components such as casings has been relatively straightforward for China, around 70 percent of the cost of the typical industrial robot comes from three complex and high-value components: servomotors, reduction gears, and control systems, which are still largely manufactured by foreign players. In the case of servomotors, China now has the capability to produce previous-generation but not leading-edge components. Nevertheless, leading Chinese players such as Innovance have made some headway, and they command 8 percent of the global market today. Chinese companies gained a foothold in the manufacture of robot controllers through acquisition (KUKA, for example), but most leading players are still in Germany and Japan. The reduction gears market is still largely controlled by Japanese players, which have about an 85 percent market share; there are no sizable Chinese players (Exhibit 27).

China's progress in robotics has partly been driven by investment in automation (the first element) and government support for creating and expanding the market (the third element). Financing for robotics projects increased from just 698 million renminbi in 2014 to 20 billion renminbi in 2017.[1] Between 2015 and 2018, Guangdong Province spent $150 billion in subsidies to foster greater automation by local manufacturers.[2] Automation has provided a strong imperative for investment. The level of automation in China is low, and yet labor costs are rising rapidly. Average urban wages increased by 11 percent per year between 2010 and 2017. The Chinese government has made digitization and automation a strategic priority. One aim is to increase the density of robots used in the economy to 150 per 10,000 employees by 2020, from 97 in 2017 (compared with 200 in the United States, 308 in Japan, and 710 in South Korea). China is making good progress, considering that industrial automation was only at 51 robots per 10,000 employees two years before. These factors will likely continue to support strong demand growth for industrial robots in China for years to come.

1 *Selling a robot losing 18,000, the industrial robot industry is mad and after a crisis,* PEDaily.cn, September 27, 2018, m.pedaily.cn/news/436171.
2 He Huifeng and Celia Chen, "'Made in China 2025': A peek at the robot revolution under way in the hub of the 'world's factory,'" *South China Morning Post,* September 18, 2018.

Exhibit 26

Chinese suppliers are gaining share in small, low-complexity segments of the domestic industrial robots market.



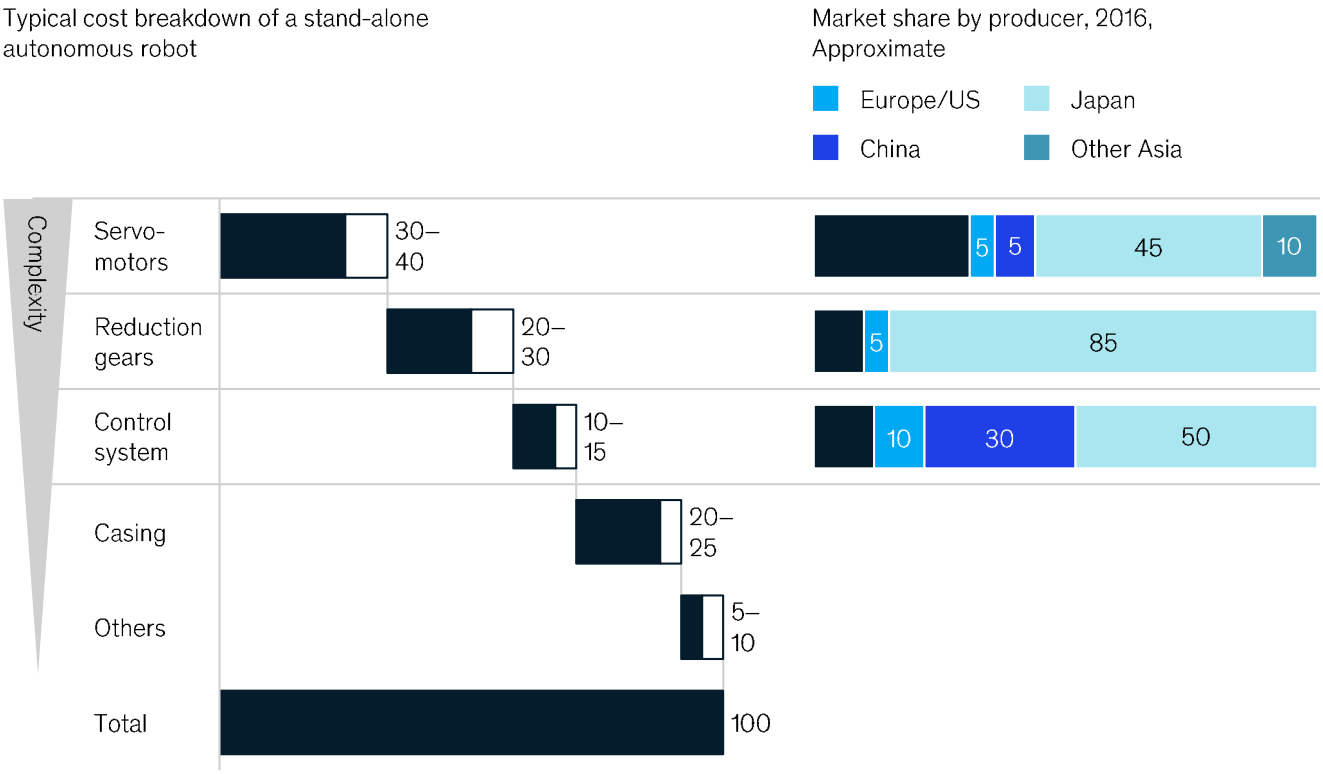
[1] Does not include KUKA, which was acquired by Midea in 2016.
[2] A ratio of >1 means the robot is faster than the human operator.
Note: Figures may not sum to 100% because of rounding.

Source: International Federation of Robotics, 2018; McKinsey Global Institute analysis

Exhibit 27

China is dependent on global supply for some key components in robotics.

%



Source: Analyst reports; McKinsey Global Institute analysis

China has many strengths that suggest it can be a credible player both at home and abroad, including the largest market in the world in both industrial and service robotics, and plenty of investment. The government has signaled its intent to indigenize this sector to a large extent. It has set goals for 2025, including for local OEMs to attain a 70 percent market share by 2025, and for 70 percent of the cost of robots to be locally produced.

However, China could secure far larger returns by focusing on developing competitive "solutions" beyond the manufacture of robotics, using equipment from foreign or local players, depending on performance. For example, the potential of fully digitizing China's manufacturing sector, which recorded combined revenues of $17 trillion in 2017, with best-in-class technology is larger than that of indigenizing the domestic $4.5 billion industrial robotics market. MGI research has found that advanced robotics in smart manufacturing can increase labor efficiency by between 20 and 50 percent. Other McKinsey research finds that intensifying global competition in robotics manufacturing is shifting value pools from machinery products to software and services.[1] Working with international partners to acquire best-in-class technology and know-how can be helpful in capturing this potential.

[1] *Leveraging industrial software stack advancement for digital transformation: How to capture impact at scale with IIoT platforms in the industrial equipment and machinery space,* Digital McKinsey, September 2018.

Greater integration of China into global robotics value chains would have significant benefits for players in the rest of the world, not least because they would be assured of access—or greater access—to the largest and fastest-growing market; China accounted for 52 percent of industrial robot demand growth from 2012 to 2017. In addition, China's enormous scale provides a unique environment for experimentation and innovation. Its scale in manufacturing, rising labor costs, and aging population are all factors that increase the imperative to automate, which in turn could create an environment that is ripe for experimentation. Chinese innovation could be suited to emerging markets in the rest of Asia and beyond as they move toward automation. Local players are already taking advantage of China's scale for testing. Popular e-commerce platforms Alibaba and JD.com have launched labs that develop and test automated solutions for logistics and smart warehousing. While developed economies with high wages have typically opted for expensive, fully automated industrial solutions, emerging markets' typically lower labor costs may lead to increased demand for collaborative robots (cobots) that require some human interaction and provide more flexibility. China is already the largest market for cobots, and sales more than doubled from 2016 to 2017 alone.

Semiconductors: China largely depends on global players across value chains, but new opportunities are emerging

Semiconductors has been a designated strategic industry in China for two decades.[1] As a result, substantial investment has been made (the first element), and China has become the largest market for semiconductors in the world (the third element) thanks to huge demand in downstream sectors such as personal computers, smartphones, smart televisions, EVs, robotics, and more. The Chinese government identified new-generation information technology as one of its seven pillar industries in 2010. In 2014, China raised $22 billion for its strategic integrated circuit industry and in 2018 announced another investment fund of about $47 billion.[2] Chinese semiconductors now account for 45 percent of global consumption.

>$313b

integrated circuits imported by China in 2018 vs

$239b

crude-oil imports

Despite these efforts, China's domestic semiconductor industry has made only moderate progress. China imported $313 billion of integrated circuits in 2018, more than its $239 billion imports of crude oil.[3] China's presence in integrated device manufacturing and equipment is minimal. The country has made some progress in fabless, where its global market share increased from 11 percent in 2013 to 15 percent in 2017, and foundry manufacturing, where its market share is 8 percent (down slightly from 9 percent in 2013). In all other parts of semiconductor production, China lags behind its counterparts in the developed world in market share (Exhibit 28). The government has announced plans to expand the domestic supply of semiconductors with the aim of hitting targets by 2030 of $305 billion of domestic production of chips (from $65 billion in 2016), and 80 percent of domestic market served (from 33 percent in 2016).[4]

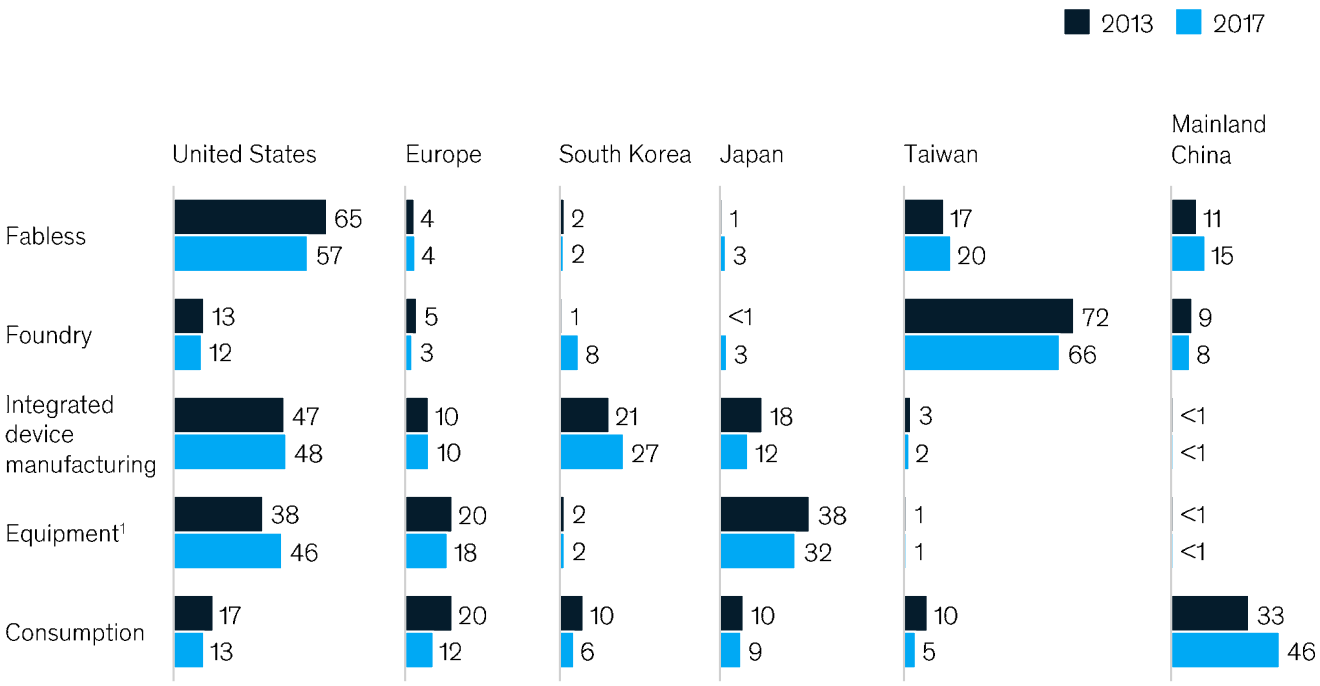
China's relatively moderate progress is not surprising. In this sector, the technology barrier is extremely high. No one country has fully indigenized and achieved self-sufficiency in its semiconductor value chain. Compared with LCD, whose manufacturing process has about 11 process steps, semiconductor manufacturing has up to 1,200 process steps over a six- to eight-week cycle.[5] Furthermore, as manufacturing advances, the complexity of the process, and therefore the investment needed, increases exponentially. This makes it even more difficult and expensive for lagging players to catch up. For example, it takes about 500 steps to create a 20 nm chip in a foundry environment, but 1,500 steps for a 7 nm chip. Similarly, setting up 1k wafer capacity would cost $500 million based on 32 nm technology, but $2 billion using 7 nm technology.[6]

1 Alexander Chipman Koty, "Chips all in: Investing in China's semiconductor industry," *China Briefing,* March 2, 2016.
2 Yoko Kubota, "China plans $47 billion fund to boost its semiconductor industry," *Wall Street Journal,* May 6, 2018.
3 UN COMTRADE; International Trade Center.
4 Marcelo Duhalde and Yujing Liu, "'Made in China 2025': How Beijing is boosting its semiconductor industry," *South China Morning Post,* September 25, 2018.
5 *LCD production process & our equipment,* Nakan. nakan-techno.co.jp/en/technology/product_equipment.html; and Michaela D. Platzer and John F. Sargent Jr., *U.S. semiconductor manufacturing: Industry trends, global competition, federal policy,* Congressional Research Service, June 27, 2016.
6 SemiWiki; IC Knowledge.

Exhibit 28

China's footprint in semiconductor value chains is relatively small.

Semiconductor market comparison by region (HQ location)
Global share
%



[1] Semiconductor wafer fab equipment.
Note: Figures may not sum to 100% because of rounding or because consumption in other regions not covered.

Source: IHS Markit; Gartner; IC Insights; McKinsey Semiconductor Practice; McKinsey Global Institute analysis

That said, China has made some progress in building a market position in manufacturing of some lagging technologies. For instance, Chinese foundries have a 19 percent market share in 65 nm semiconductors and a 12 percent share in 45 nm semiconductors. These technologies have a scope of applications in end-use consumer electronics.

Apart from the technological barriers to developing an indigenous semiconductor industry, there are indications that previous efforts by the Chinese government to cultivate this sector may have been inefficient. Its investment in the industry, while large, may be misplaced in companies that do not have promising technology. One report estimates that 50 percent of new Chinese fab projects could fail.[1] Because a good amount of investment in semiconductors comes from provincial-level funds, a surplus of capital also creates an environment of competition for semiconductor talent, which is a scarce resource in China. Some estimates put the semiconductor talent gap in China at more than 400,000 employees.[2] Finally, a less concentrated investment model, under which funds are distributed to different provinces and companies, may generate less productive results. McKinsey research suggests that spreading semiconductor R&D efforts across multiple sites leads to an average efficiency loss of more than 10 percent.[3]

[1] Mark Lapedus, *China: Fab boom or bust?* Semiconductor Engineering, March 16, 2017.
[2] Chris Richard, Karthik Ramachandran and, Ivan Pandoy, *Looming talent gap challenges semiconductor industry,* Semi, 2019.
[3] Christopher Thomas, *A new world under construction: China and semiconductors,* McKinsey & Company, November 2015.

An opportunity exists for China to continue its development starting from the low end and gradually moving toward the high end. Integration with global value chains can accelerate that journey, in particular by creating opportunities for better access to technology and know-how (the second element). Crucially, China needs access to the latest technology, and this may prove difficult. A number of Chinese M&A bids designed to acquire semiconductor technologies abroad have been unsuccessful, and leading semiconductor players may be unwilling to move leading-edge R&D centers and manufacturing to China to prevent potential IP leakage issues. Chinese chip and equipment exports are also scrutinized due to security concerns.

Another opportunity for China and the world to collaborate is to innovate in new areas of semiconductor technology. The incremental improvements in productivity for silicon-based semiconductor chips are nearing the theoretical limit under Moore's Law, and new solutions will need to be developed for next-generation semiconductors. New materials, like graphene and gallium nitride, are being tested as viable alternatives to silicon.[1] Three-dimensional integrated circuits are being developed to reduce inefficiencies associated with 2-D chip connection.[2] Photonics is also being considered as a low-energy solution to transmitting data for applications like machine learning.[3] These are potentially new areas for global collaboration, and creating the next generation of technological solutions will require greater integration and mobility of talent.

Abiding by global standards could facilitate capital and knowledge inflows to China. Gartner data show that $63 billion in capital expenditure in wafer capacity is expected to happen in China from 2019 to 2022 (representing 24 percent of the total). However, we should also note that almost half of the announced investment in new wafer manufacturing capacity is expected to come from multinational corporations (Exhibit 29).

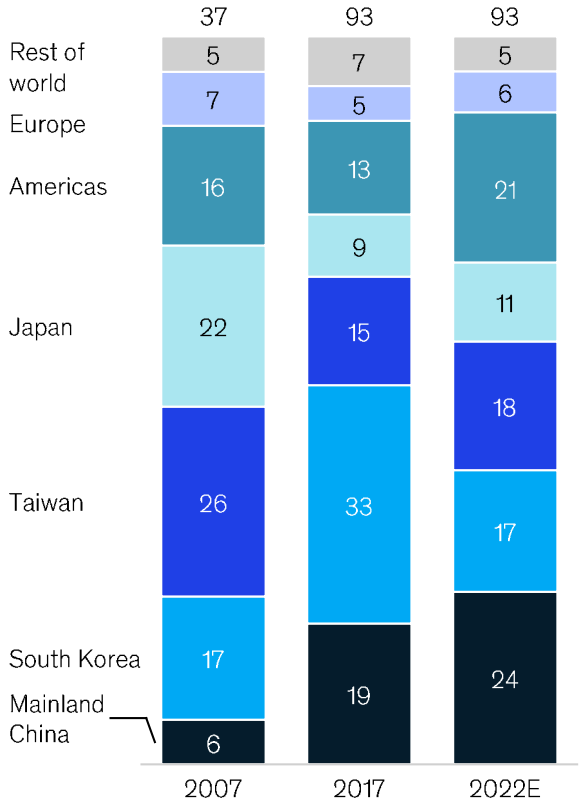
Enhanced protection of IP could further encourage multinational corporations to set up more cutting-edge facilities and centers for R&D activity in China, beyond the manufacturing of lagging-edge products (see Box 6, "IP and data sovereignty in China"). By being open to foreign participation in the sector, China can also benefit from inflows of knowledge and greater mobility of people with needed skills, both of which would be useful to domestic firms.

1 Gauray Batra, Nick Santhanam, and Kushan Surana, *Graphene: The next S-curve for semiconductors?* McKinsey & Company, April 2018; and Angela Chen, *Gallium nitride is the silicon of the future,* The Verge, November 1, 2018.
2 Tia Ghose, *3D computer chips could be 1,000 times faster than existing ones,* Live Science, September 20, 2015.
3 Brian Bailey, *Get ready for integrated silicon photonics,* Semiconductor Engineering, April 12, 2018.

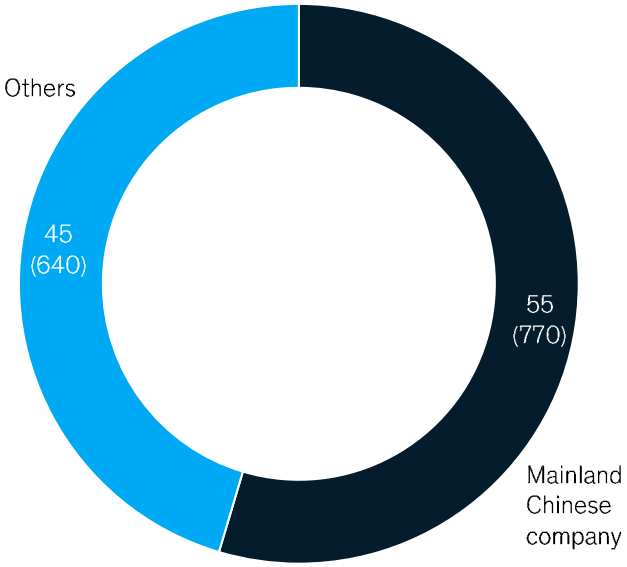
Exhibit 29

China is expected to be the main location for new wafer manufacturing capacity, almost half of which is set to come from global players.

Share of global wafer manufacturing capital expenditure by region, %; $ billion[1]



New fabs capacity in mainland China by company type, 2018–20, % (thousand wafers per month)[1]



[1] Including foundries and IDM fabs.

Source: Gartner; press search; McKinsey Global Institute analysis

Box 6

IP and data sovereignty in China

China's IP protection practices have given some foreign players pause for thought, contributing to tension and even practical difficulties for China in accessing technology that it cannot develop and produce domestically. As an example of tension, after a seven-month investigation, the US Trade Representative argued that China's current IP practices had resulted in considerable costs for the United States.[1] BSA The Software Alliance estimated in 2018 that 66 percent of PC software installations in China are unlicensed, representing commercial value of $6.8 billion. This compares with a global average of 37 percent.[2]

China has been improving its IP protection over the past decade. Chinese courts heard a total of 213,480 IP protection cases in 2017, 40.4 percent more than in 2016, and double the number in 2013.[3] In 2017, China stepped up statutory damages for patent infringement, and IP courts have mirrored this official effort with higher damages in their rulings. The average damages awarded for patent infringement by the Beijing IP Court more than tripled between 2015 and 2016. China has also been addressing possible bias against foreign firms, for instance running a four-month nationwide campaign across 12 government agencies to protect foreign firms' IP rights in late 2017.[4] In December 2018, China announced 38 different punishment measures for IP violation.[5] In late 2018, the National People's Congress approved the creation of an appellate IP tribunal within the Supreme People's Court, which went into operation on January 1, 2019.[6] China plans for its IP court system to cover the whole country by 2020.[7] These efforts have not gone unnoticed. In the American Chamber of Commerce's annual Business Climate Survey, more than 96 percent of responding firms indicated China's enforcement of IP regulation was stable or improved from 2012 to 2017.[8]

Data sovereignty is another area of dispute. Under China's 2017 cybersecurity law, business, economic, technological, and personal data generated and gathered in China must be kept on domestic servers and cannot be exported without permission. Foreign investors in China can be asked to provide source code, encryption, or other crucial information for review by the government, which could mean they risk data being lost, passed on to competitors, or used by the government.[9]

Mutual understanding and alignment on IP protection and data sovereignty would further integration, which would benefit not only China but also the rest of the world. In the long term, it is also in China's interest to protect IP, because Chinese companies are already accumulating valuable IP in technologies such as AI.

1 *Findings of the investigation into China's acts, policies, and practices related to technology transfer, intellectual property, and innovation under Section 301 of the Trade Act of 1974,* Office of the United States Trade Representative, Executive Office of the President, March 22, 2018.
2 *Software management: Security imperative, business opportunity,* BSA Global Software Survey, BSA The Software Alliance, June 2018.
3 "Supreme People's Court to set up IPR court," Xinhua, December 29, 2018.
4 William Weightman, "China's progress on intellectual property rights (yes, really)," *Diplomat,* January 20, 2018; and Renjun Bian, *Many things you know about patent infringement litigation in China are wrong,* November 11, 2017.
5 "China announces punishments for intellectual-property theft," Bloomberg, December 4, 2018.
6 Peter Leung and John Butcher, "China to open national IP appeals court amid U.S. trade spat," Bloomberg Law, November 6, 2018.
7 *Updates on China's specialized IP courts and tribunals,* AFD China Intellectual Property Law Office, January 27, 2019.
8 *2018 China Business Climate Survey,* American Chamber of Commerce in China, January 2018.
9 Daniel Wagner, "China's cybersecurity law is biased and open to abuse, but it may not stop others copying it," *South China Morning Post,* June 25, 2018.

Structural reform to create more competitive pressure and encourage more participation from the private sector can also be helpful in building an effective system (the fourth element). We are now seeing major Chinese technology companies such as Alibaba and Tencent beginning to develop their own versions of AI chips.[1]

Greater Chinese integration could also provide significant benefits for the rest of the world. China is already the largest market for semiconductor consumption and will continue its accelerated growth as its population urbanizes and incomes rise. The downstream applications of semiconductors in China offer a particular opportunity, as China's scale can provide optimal testing grounds for innovation. For example, consider that China accounts for more than 40 percent of global e-commerce; the AI opportunity in this application alone could be tremendous. The scale of robotics manufacturing in China—as we have noted, 36 percent of global industrial robotics demand—creates major opportunities for digitization as well.

• • •

China has become a global player in digital technologies and is a world leader on the supply of AI. But the market share commanded by Chinese players both in the home market and in global markets varies enormously. China has strength on two of the four elements that need to be in place to rise up the technology value chain, but weaknesses in the other two. There are choices to be made about whether indigenization or a blend of local and global capacity and players will deliver the competitive solutions that China needs for the health of the broader economy. In the next chapter, we look at China's consumer sector, now the bedrock of the country's economic growth.

[1] Coco Liu, "Alibaba to produce its first self-developed AI chip next year," *Nikkei Asian Review,* September 19, 2018; and Yimian Wu, *Tencent leads $50m pre-A round in Chinese AI chipmaker Suiyuan Technology,* China Money Network, August 7, 2018.

百一店
東方商厦
南京路步行街

4 China's consumption offers new opportunities for the world

China's consumption and consumer market are important links between the country and the world. Since China started opening up, foreign businesses have entered the market seeking new growth opportunities. Today, Chinese consumers demand more choice and higher quality that domestic providers alone may not be able to provide, offering further opportunities for integration. Although China's consumer-facing companies have made significant headway in the domestic market, their penetration in international markets has been limited. As noted in chapter 1, the only Chinese company that appears in listings of the top 100 global brands in 2018 was Huawei. While Chinese consumers are buying more imported goods—with e-commerce an increasingly popular channel—China still imports a lower share of consumer goods than other countries. Chinese services remain restricted for foreign participants; easing those restrictions could bring the same competition that has raised quality and choice in consumer goods. Finally, more can be done to tap the spending power of Chinese citizens who are increasingly traveling overseas as students and tourists.

In this chapter, we first look at the considerable momentum of China's consumer markets and the changing dynamics of multinational corporation competition in China. We then highlight two trends that can present opportunities for China to integrate further with global consumer value chains, offering benefits to players in China and around the world.

China's consumer market has considerable growth momentum

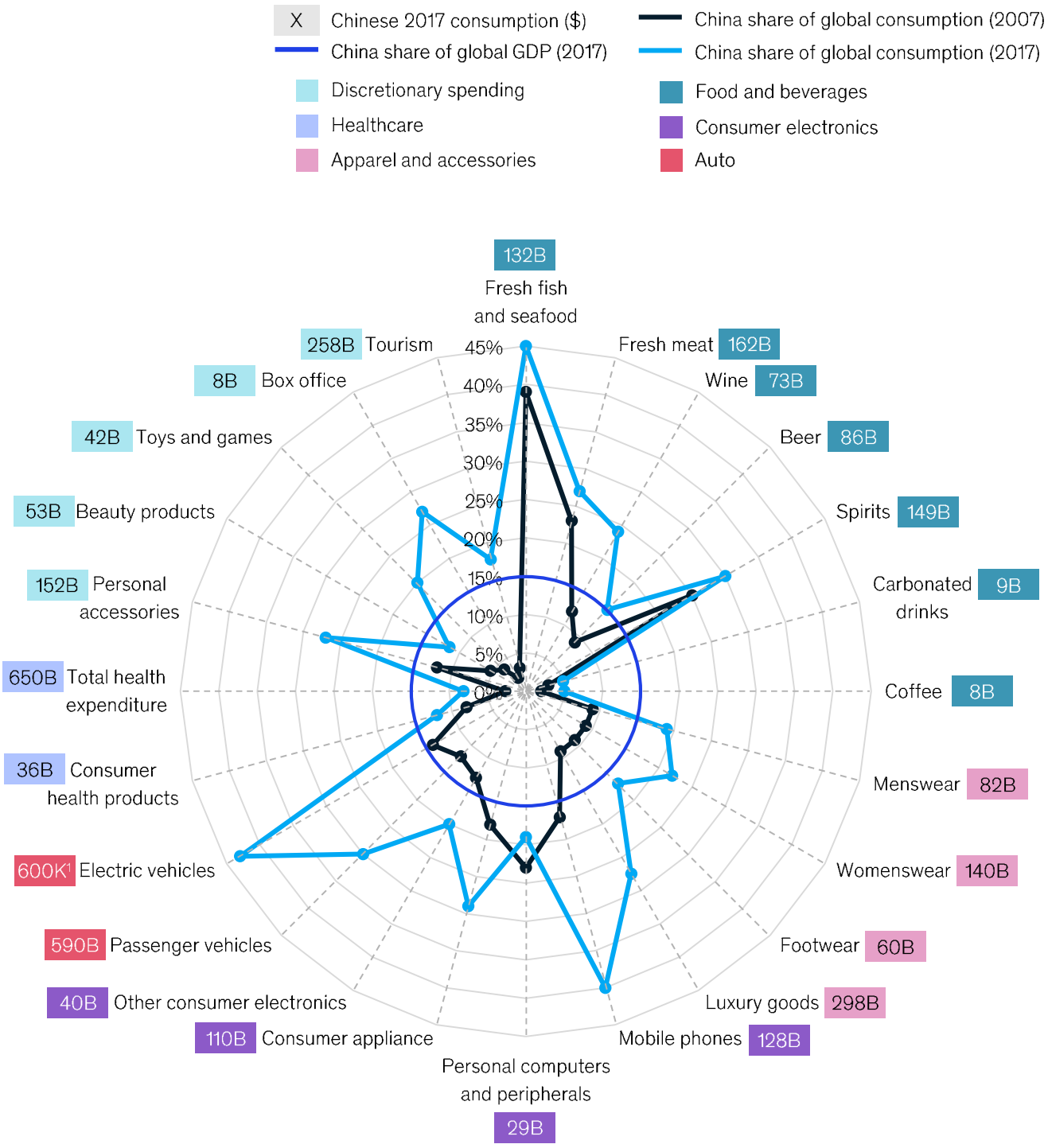
In 2017, Chinese consumers accounted for more than 40 percent of sales of EVs, 30 percent of global car sales, 45 percent of fish and seafood, 37 percent of fresh meat, 24 percent of wine, and 22 percent of womenswear. Across 24 consumption categories we studied accounting for $10 trillion of global consumption, China had an average 18 percent share of the global market (Exhibit 30). China's contribution to growth in various consumption categories is even more startling. In auto sales, between 2010 and 2017, China accounted for 50 percent of global growth. Chinese consumers have accounted for more than 90 percent of growth in the global box office since 2007; in 2017, they bought 27 percent of all box office receipts in the world. In economies where consumption has been under pressure, the arrival of Chinese tourists has helped to boost spending; in Thailand, for instance, spending by Chinese tourists is equivalent to 9 percent of the economy's private consumption. These trends have largely been driven by the fact that incomes in China have been growing at 11 percent a year since 2010.[1]

[1] China National Bureau of Statistics.

Exhibit 30

China's share of global consumption has grown considerably over the past decade.

Chinese consumption as a share of global market size, consumer goods industries, %



[1] Units, not dollars.

Source: Euromonitor; McKinsey Global Institute analysis

58%

of Chinese households likely to be mass affluent or above by 2030 vs

55%

of South Korean households today

Many firms rely on selling goods in China. In the United States, among the firms listed in the MSCI USA index, revenue exposure to China amounted to 15 percent of the IT sector, 7 percent of materials, and 6 percent of industrials. In 2017, US companies were estimated to have generated around $450 billion to $500 billion revenue in China through a mix of exports and revenue from Chinese subsidiaries.[1]

Previous MGI research found that three groups of consumers can generate half of consumption growth and have the power to reshape global consumer markets—and one of them is China's working-age population. By 2030, China's working-age population will account for 12 cents of every dollar spent in cities worldwide.[2]

Some observers have pointed to high debt in China, a rapidly aging population, and the consumption power of the younger generation being compromised by rising living costs in cities as grounds for caution about the prospects for consumption growth. Although these could be headwinds for China's consumption growth, we also find significant momentum behind China's consumption due to rising incomes, huge wealth accumulation by the older generation during years of rapid economic growth, and considerable intergenerational transfers.

Chinese consumers are becoming richer

China's consumption has been fueled by rising household incomes and an accumulation of wealth. The share of households in the mass affluent category and above (defined as a household with disposable household income of 18,000 renminbi or more per month) quadrupled from 3 to 12 percent from 2010 to 2018.[3] By 2030, 58 percent of Chinese households are likely to be in the mass affluent category or above, surpassing today's South Korean share of 55 percent (Exhibit 31).

Interestingly, the spending profile of urban Chinese consumers is converging with that of their counterparts in cities around the world. Residents of China's cities are devoting a greater share of their income to discretionary spending. Spending on food declined from 50 percent of total household consumption in 2000 to 25 percent in 2017. This is similar to the pattern of urban consumers in developed countries—Japan at 26 percent, South Korea at 29 percent, and the United States at 17 percent (Exhibit 32). Comparing urban China's spending profile with that of other developed Asian countries, Chinese consumers devote a larger share of spending to apparel (7 percent) and household products (6 percent), and less to personal products (3 percent).

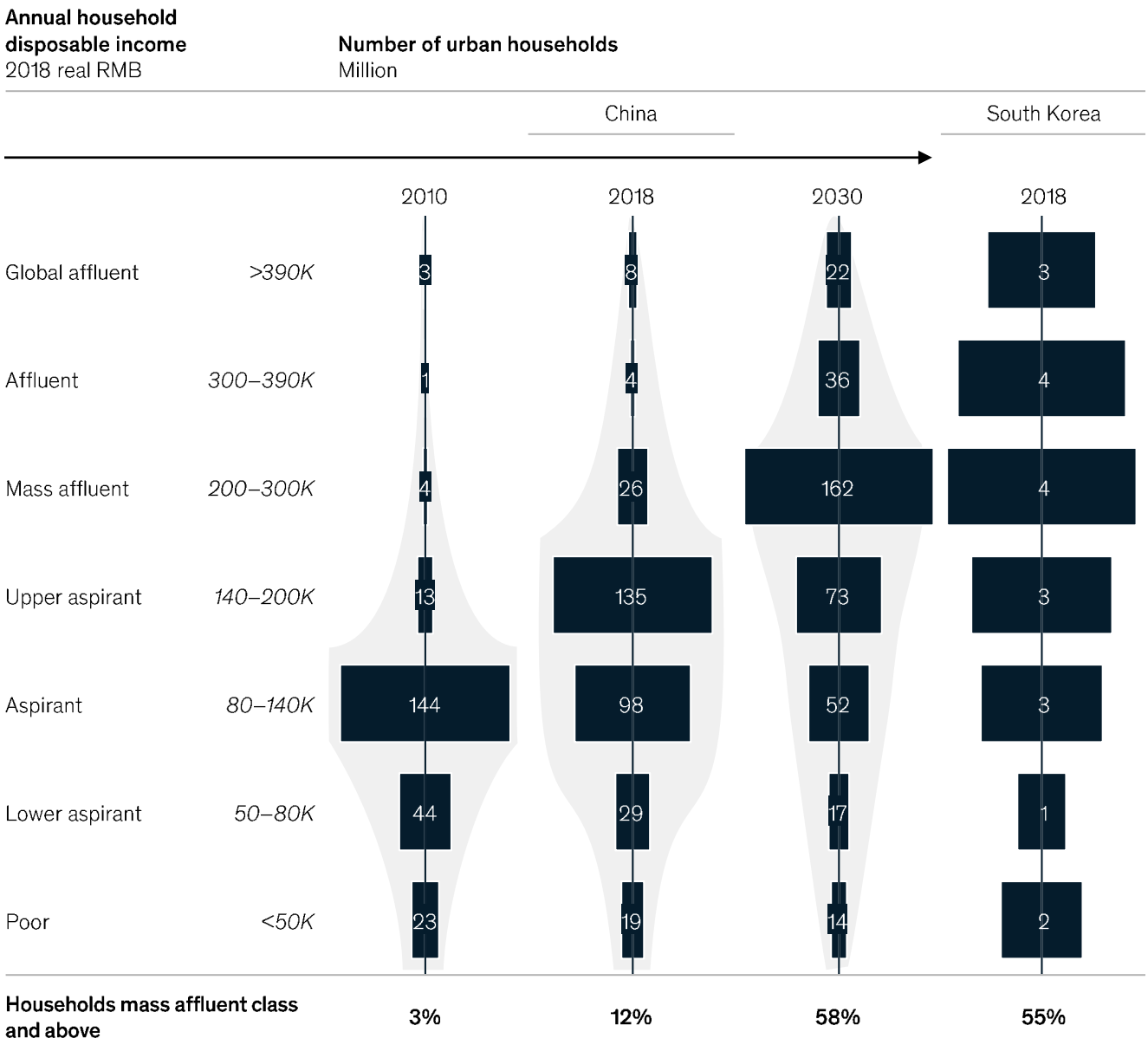
Economic transfers and wealth accumulation can help to sustain consumption across generations

Although China's old-age dependency ratio (defined as the number of elderly dependents per 100 working-age adults) has been relatively stable for the past 50 years, declining birth rates caused in part by the One Child Policy (now eased) should lead to a rise in that ratio. Between 2015 and 2050, China's old-age dependency ratio is expected to rise from 14 to 48, according to United Nations population data. By 2020, the ratio is expected to be comparable with that of South Korea today, by 2027 comparable with that of the United States today, by 2030 comparable with Germany's today, and by 2047 comparable with Japan's current ratio. By 2050, about one-quarter of Chinese citizens are expected to be aged 65 or older.

1 "America Inc and the rage against Beijing," *Economist*, June 28, 2018.
2 *Urban world: The global consumers to watch*, McKinsey Global Institute, April 2016.
3 Disposable income is defined as the total value of personal income after taxes and deductions.

Exhibit 31

Income growth is lifting households into the mass affluent class and above.

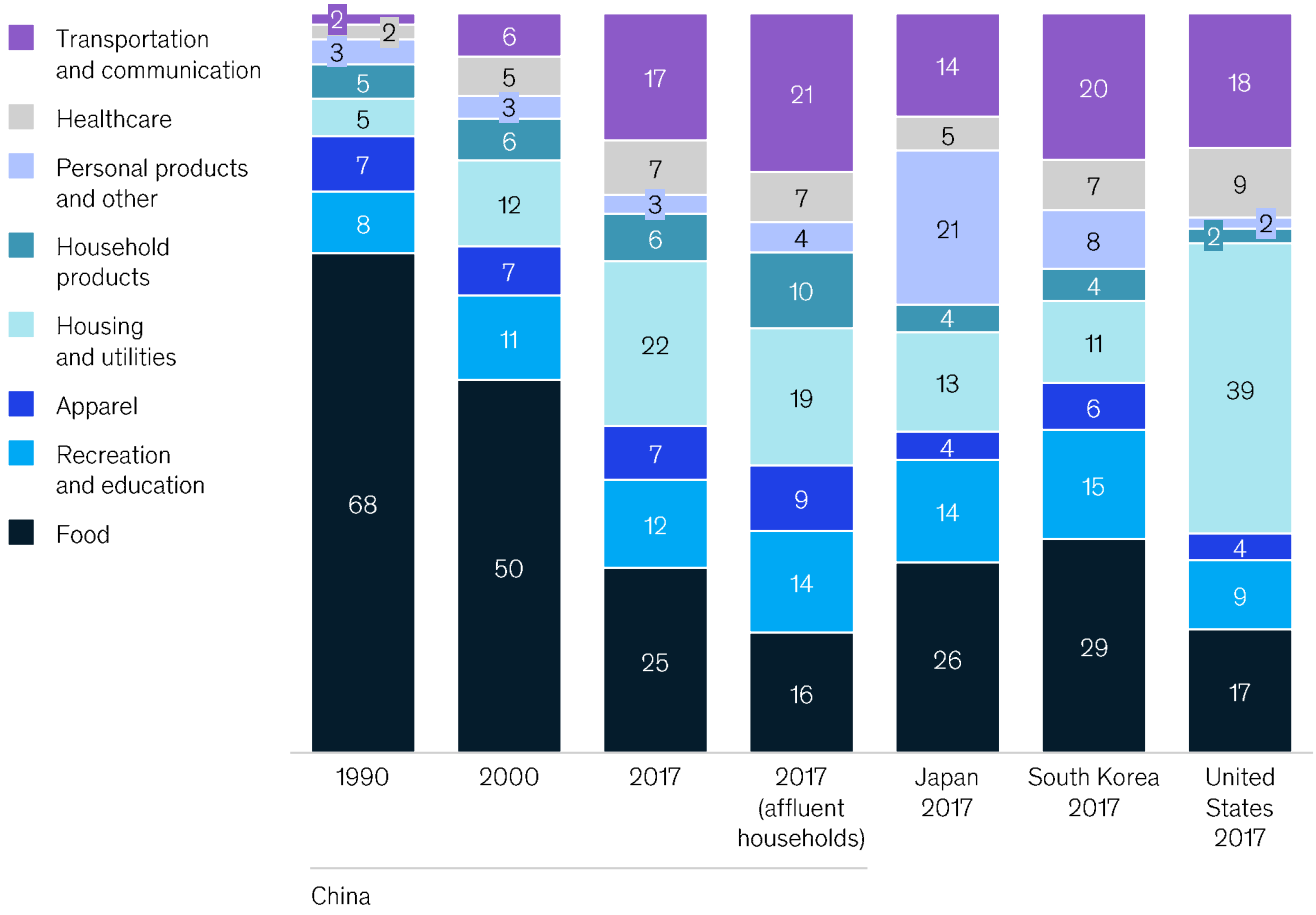


Source: Cancock Global Income Distribution Database; McKinsey Global Institute analysis

Exhibit 32

Urban Chinese consumers are increasing their share of discretionary spending and catching up with consumers in developed economies.

Annual consumption per urban household by type of good,
% of spending



Note: Figures may not sum to 100% because of rounding.

Source: National statistics offices; MGI Insights China Macro Model; McKinsey Global Institute analysis

Some observers have pointed to China's aging population as evidence that the momentum of consumption growth may weaken.[1] However, we find that that concern may be overplayed. A closer look at China's household economics suggests that aging demographics may not pose a significant risk to the strong trajectory of Chinese consumption growth. Results from a triangulation of surveys (the McKinsey China Consumer Survey, the China Aging Finance Forum 50 Survey, HSBC's Beyond the Bricks, and Xinan University of Finance and Economics survey), and expert interviews tell a more nuanced story.[2]

[1] Paula Campbell Roberts and Ken Mehlman, *What does population aging mean for growth and investments?* KKR, February 13, 2018.

[2] McKinsey's biennial survey covers 9,165 survey respondents and is segmented into different city tiers. The China Aging Finance Forum releases an annual survey that covers 45,000-plus households in urban and rural areas. HSBC's Beyond the Bricks survey covers nine countries and focuses on large cities. The Xinan University Finance and Economics report covers urban and rural counties in China and is updated biennially.

First, China's elderly (those aged 60 or above) may have accumulated a good amount of wealth to help them support their retirement. According to a 2017 report by the China Aging Finance Forum, which covered 46,000 respondents in both urban and rural communities, more than 80 percent of elderly individuals have saved at least 100,000 renminbi for retirement, and more than 50 percent have saved at least 300,000 renminbi.[1] Moreover, according to the same survey, 83 percent of elderly individuals own a property (although we note that the average property value is not defined).

Second, transfers of wealth between generations of Chinese households could help sustain consumption. According to a longitudinal survey conducted by Peking University that covers both urban and rural communities, middle-aged adults (those aged between 40 and 60) have the highest income of all age groups in China.[2] However, they face a dual financial pressure: supporting the elderly and the next generation simultaneously. In McKinsey's 2018 China Consumer Survey, which covered more than 9,000 respondents in both urban and rural communities, between 60 and 80 percent of respondents in the 40 to 60 age group indicated that they expected to reduce their own spending to take care of their parents and children. Despite the added financial pressure of having to support multiple generations, middle-aged adults may be in a relatively robust financial state. According to the China Aging Finance Forum report, 70 to 80 percent of individuals in this age group own property, and 25 to 30 percent own more than one property. Again, the extent of the wealth created by property depends on its quality and location, and therefore value. The survey does not quantify the value of the property owned by these individuals.

40–50%

of Chinese aged in their 20s and 30s say they don't worry about their income because of parental help (survey)

The younger generation, those in their 20s to 30s, may receive financial support from their family and therefore be able to spend freely (and often beyond their own means). In McKinsey's China Consumer survey, 40 to 50 percent of individuals in this age group indicated that they never worry about their income because their parents can easily cover expenses. Furthermore, around 40 percent of respondents aged 20 to 30 indicated that they had received help from their parents when buying an apartment.

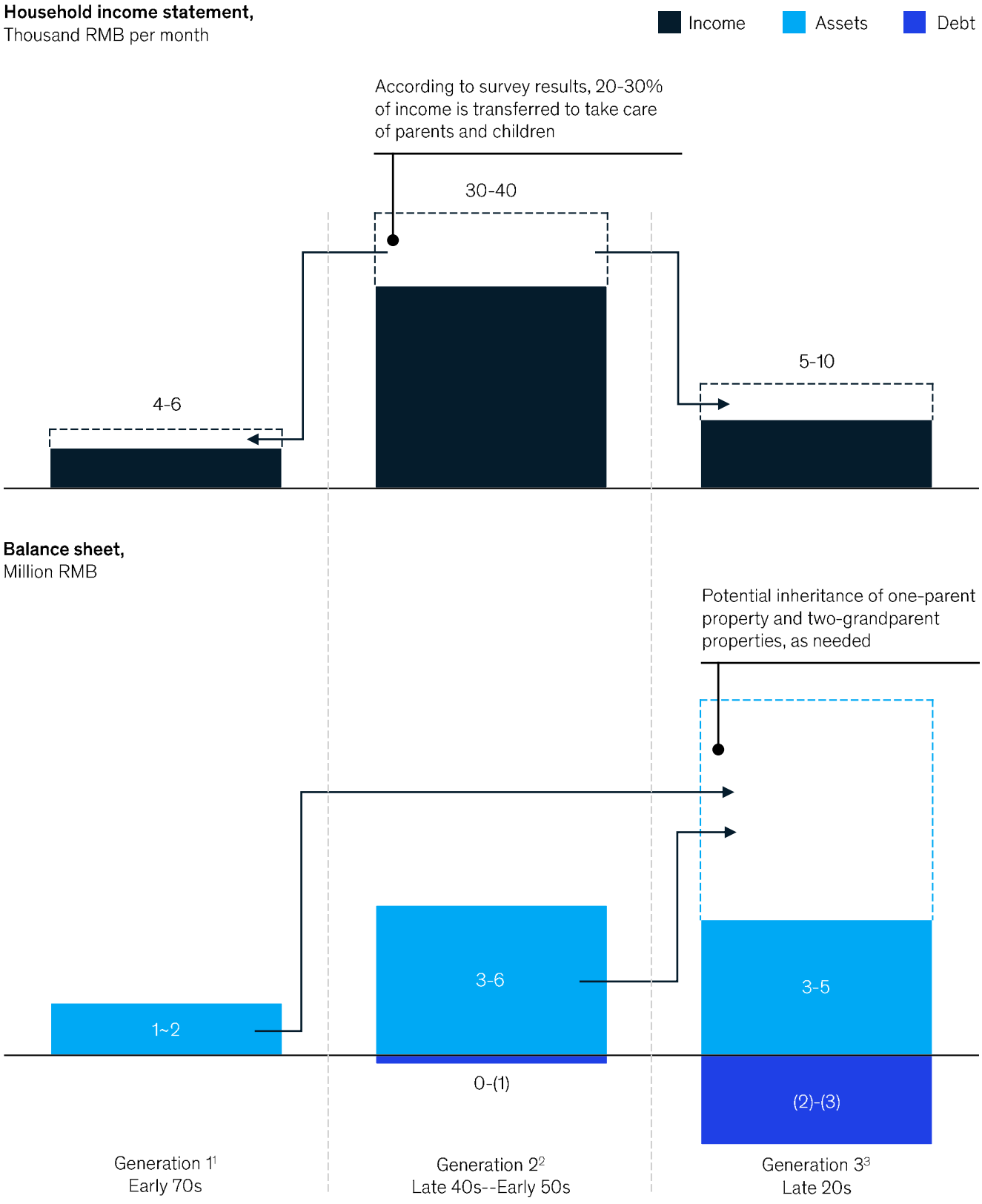
The dual effects of wealth accumulation and income transfer may smooth out purchasing power across generations. MGI created a simulation of the impact of income and wealth transfers in a hypothetical Chinese family living in a large city (Exhibit 33). Family members in the first generation are in their 70s and live in Tier 2 or 3 cities (with a combined population size across all ages of about 500 million) in apartments that they own (that were privatized and provided by the state). They live on two small pensions and have sizable savings that were accumulated during their working years. Members of the second generation moved into a Tier 1 city (such as Beijing or Shanghai, with more than ten million residents) and purchased an apartment that has appreciated significantly in value. The two working adults in this generation may earn sufficient income to define them as affluent, but they may divert nearly one-third of that income to the older (parents) and younger generations (often one child). The third generation consists of young adults who have just begun to work in a Tier 1 or 2 city, earn enough for subsistence, and save little. However, these individuals receive help from their parents, who are expected to contribute a down payment when they marry and purchase a first apartment. The third generation can expect to inherit significant property from the previous two generations. Our analysis suggests that this transfer downward is likely to persist and be substantial because the third generation may inherit high-value properties from their parents. Upward wealth transfers to the elderly tend to be less significant in wealthier households because elderly members can already cover most of their own living costs.

1 *China Ageing Finance Survey Report 2017*, CAFF50, 2017.
2 *The China Health and Retirement Longitudinal Study (CHARLS)*, charls.pku.edu.cn/en.

Exhibit 33

Intergenerational transfers of income and property may smooth out Chinese spending power.

SIMULATION: ILLUSTRATIVE URBAN HOUSEHOLD IN TIER 1 / TIER 2 CITIES



[1] Retired, lives in owned apartment in Tier 2 or 3 city; mortgage paid off; monthly pension income of 4,000 to 5,000 renminbi.
[2] Owns apartment in Tier 1 city; 90 percent of mortgage paid off; earned monthly post-tax income of 30,000 to 40,000 renminbi.
[3] Expected to purchase an apartment in a Tier 1 city on marriage.

Source: CHARLS 2015 survey; CEIC; Beijing Statistics Bureau; China Consumer Survey 2017; McKinsey Global Institute analysis

We note that these findings are based on a snapshot of a hypothetical Chinese household today, and there could be large variances influenced by demographics including aging, inequality among income groups and geographies, and the presence of, or lack of, social safety nets. Evidence exists that China's population is aging faster than expected due to lower-than-expected birth rates. The total population is expected to start to shrink by 2030.[1] The government has also acknowledged that rising pension and social welfare costs will be a risk to China's economic growth. One study describes how an aging population will reduce the supply of labor, increase the cost of social welfare, erode national savings and capital accumulation, and decelerate technological progress.[2] The study estimates that China's aging population could cause a cumulative deceleration in GDP growth from 8.8 percent per year in 2011 to 2015 to only 2 percent between 2046 and 2050.

Multinational corporations face a changing competitive landscape in Chinese consumer markets

China's rapidly expanding consumer market is already highly integrated with global value chains. In fact, our analysis of top 30 brands in the ten large consumer categories suggests that multinational corporations' average penetration in China was 40 percent in 2017, compared with 26 percent in the United States. In some categories, penetration is even higher; for instance, in beauty and personal care, multinational corporation penetration is as high as 73 percent (Exhibit 34). For some years now, consumer goods sectors have been relatively open to foreign companies. When China joined the WTO, the accession agreement stipulated that China should gradually eliminate market barriers on foreign companies, and in 2004 China started permitting foreign investors to establish retail businesses throughout the country.[3]

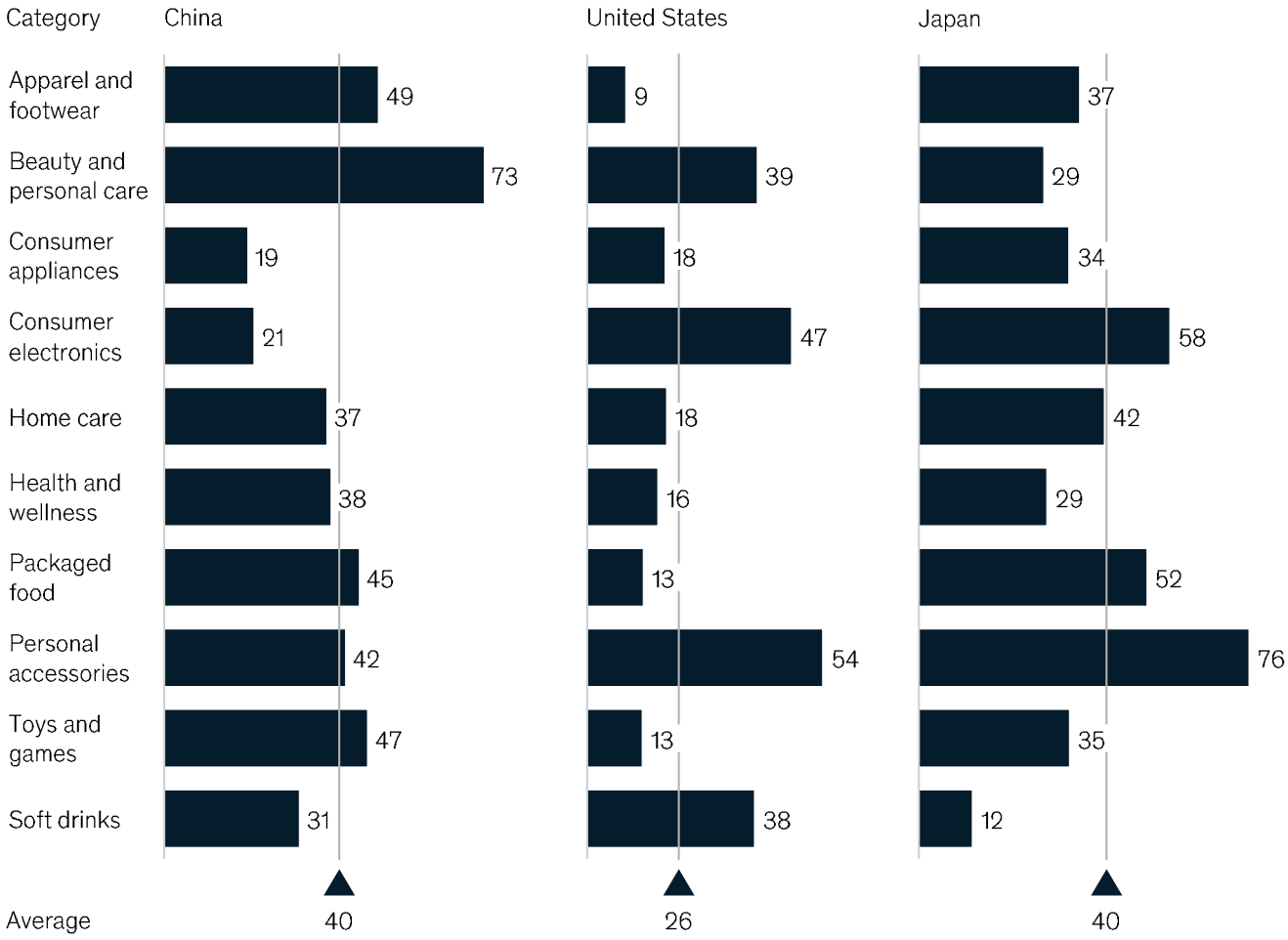
The presence of foreign companies has brought competition to China's consumer markets and catalyzed the development of home-grown companies that are now taking market share from foreign multinational corporations in certain categories. One well-known example is the way in which smartphones from global brands motivated the rapid upgrading of domestic brands' products. Furthermore, multinational corporations have brought talent with them. One study from LinkedIn showed that the percentage of business leaders moving from foreign to Chinese companies reached 31 percent between 2014 and 2018, while only 10 percent moved from a Chinese to a foreign company.[4] Finally, multinational corporations that entered the Chinese consumer market have brought with them manufacturing excellence tools and approaches that have helped local players upgrade their capabilities.[5]

1 "China's demographic danger grows as births fall far below forecast," *Wall Street Journal,* February 9, 2019, wsj.com/articles/chinas-demographic-danger-grows-as-births-fall-far-below-forecast-11549717201.
2 Dong Keyong, *Population aging and its influences on the economy and society in China,* EU-China Social Protection Reform Project, August 2016.
3 "Understanding China's retail market," *China Business Review,* US-China Business Council, May 1, 2010.
4 Zara Ingilizian, *How local companies are winning over China's consumers,* World Economic Forum, January 25, 2018.
5 Karel Eloot, Alan Huang, and Martin Lehnich, "A new era for manufacturing in China," *McKinsey Quarterly,* June 2013.

Exhibit 34

Multinational corporation penetration in China is higher than in the United States.

Foreign multinational corporation market share of top 30 brands by category and market, 2017, %



Note: Figures may not sum to 100% because of rounding.

Source: Euromonitor; McKinsey Global Institute analysis

The upgrading of goods from domestic companies has appeared to change the balance between them and multinational corporations. McKinsey's 2017 China consumer survey found that in the majority of categories, the origin of the brand mattered less than before. Chinese consumers are primarily seeking value for money—and that can come from local or foreign brands. Indeed, in eight of the 17 categories, respondents expressed a clear preference for local brands, and these categories account for more than half of total retail sales in China.[1]

Multinational corporations are beginning to take Chinese players seriously. In our study of 30 categories of consumer goods, foreign brands gained share in 14 categories and retained share in five categories, but they lost share in the other 11 (Exhibit 35).

~10%

share of Chinese smart phone market held by foreign multinationals in 2017 from

90%

in 2008

— **Categories where multinational corporations gained share.** Multinational corporations have succeeded most in categories where they have been able to sustain differentiation from local counterparts, and where consumers perceive their goods to be of superior quality. Examples include sportswear and baby food, where foreign brands are identified as premium; in these categories, multinational corporations have increased their share by 20 percentage points since 2008. In sportswear, foreign brands accounted for 52 percent of total sportswear in 2017, compared with 31 percent in 2008. Nike and Adidas are each estimated to have over 20 percent market share in the Chinese sportswear category. In baby food, the multinational corporation share grew by 27 percentage points in the premium segment between 2008 and 2017, by 17 percentage points in the mid-tier segment, and by 17 percentage points in the lower segment. Eight of the top ten baby food brands in China belong to multinational corporations.

— **Categories where multinational corporations lost share.** In categories that have been commoditized or where differentiation has been eroded, multinational corporations have lost significant share. In the case of smartphones, where Chinese players have caught up on technology and competition has increased, multinational corporations lost share at all price points between 2008 and 2017. Their overall market share declined from 90 percent in 2008 to about 10 percent in 2017. The top four smartphone manufacturers are all local brands. Multinational corporations have also lost market share to Chinese players in categories where consumers may perceive little difference in quality between the two. Dishwashing liquid is an example. The top two players in the category are both local brands, which together account for more than 50 percent of the market.

— **Categories where multinational corporations retained share.** Multinational corporations retained share in categories where they have been able to defend their premium positioning but where upgrading of local brands has begun. Even in these categories, multinational corporations are also losing share in lower-end segments. For instance, in beauty and personal care, they have lost 5 percent share at the low-price end of the market, but, because of consumption upgrades (and multinational corporations' ability to retain a premium positioning), they have maintained share in the overall category. In particular, Chinese companies have focused on the mass beauty segment, where they have a combined 26 percent share. Similarly, in passenger vehicles, multinational corporations have lost 8 percent share in the mid-tier segment and 17 percent share in the low-end segment, but they have retained share in the premium segment. The top five brands for low-end passenger vehicles are all local and together command more than 50 percent of the market.

[1] Wouter Baan, Lan Luan, Felix Poh, and Daniel Zipser, *Double-clicking on the Chinese consumer: The new health craze, the rise of the post-90s generation, and other trends worth watching,* McKinsey & Company, November 2017.

Exhibit 35

Multinational corporation performance in China's consumer categories has been mixed.

	Category	Market size, 2017, $ billion	Multinational corporation market share, 2017, %	Multinational corporation share change, 2008–17 Percentage points
Foreign brands more important in the Chinese market	Sportswear	31	52	21
	Baby food	25	84	18
	Surface care	2	40	12
	Footwear	57	23	12
	Bags and luggage	28	23	7
	Laundry care	10	29	6
	Traditional toys and games	11	11	5
	Snacks	50	18	4
	Homewares	15	12	3
	Apparel	288	7	3
	Spectacles	9	11	3
	Home furnishings	95	5	2
	Beer	71	12	2
	Jewelry	98	2	1
Foreign brands retained share in the Chinese market	Personal luxury	22	73	0
	Spirits	200	<1	0
	Beauty and personal care	13	55	0
	In-home consumer electronics	30	21	0
	Pediatric consumer health	3	37	0
Foreign brands less important in the Chinese market	Dishwashing	2	17	-2
	Computers and peripherals	26	39	-2
	Over-the-counter drugs	13	13	-2
	Major appliances	51	8	-2
	Small appliances	62	10	-3
	Watches	10	47	-4
	Carbonates	17	7	-5
	Passenger vehicles	528	62	-13
	Video games	30	15	-13
	Pet food	2	40	-17
	Smartphones	94	13	-81

Source: Euromonitor; IHS Markit; McKinsey Global Institute analysis

These trends point to a strengthening of China's domestic consumer-facing players. As multinational corporations have increased competitive pressure on Chinese players, they have been forced to innovate and upgrade to meet consumer demands. In some cases, local players have not only captured additional share in China, but have also begun to export. In the case of smartphones, Apple and Samsung had historically been considered the leading brands in China, and they retained some presence at the premium end of the market. However, over the past decade, domestic competitors have come to the fore. Chinese players including Huawei, Oppo, Vivo, and Xiaomi increased their market share by 81 percentage points from 2008 to 2017, and some Chinese smartphone manufacturers are now exporting. For instance, Transsion has the bestselling smartphone in parts of Africa and Xiaomi is the best-selling smartphone brand in India according to IDC data. Huawei and Oppo are among the top three brands in markets including Colombia, Malaysia, and Vietnam, measured by market share.

China's rapid progress on digital technologies has enabled it to incubate strong domestic brands of smartphone software. As recently as 2014, WeChat had a 38 percent penetration in Malaysia, 22 percent in India, and 14 percent in the United Arab Emirates and South Africa.[1] TikTok has 40 million active users in the United States.[2] Overseas success has been powered by strategic investments by Chinese digital giants. Alibaba's overseas investments increased from just $520 million in 2013 to more than $6 billion in 2017, according to CB Insights. Similarly, Tencent's overseas investments increased from $260 million in 2013 to over $6 billion in 2017.

$37.9b

Chinese mobile games market vs

$30.4b

US market

Another area in which Chinese players have become global leaders is mobile games. China is now the largest games market in the world at $37.9 billion, compared with the United States at $30.4 billion.[3] Historically, global demand for mobile gaming was captured by titles from foreign firms, but Chinese brands have become increasingly popular in recent years. Chinese titles such as Rules of Survival and Arena of Valor are not only taking market share from foreign incumbents in the domestic market—a 17 percentage point increase in share from 2008 to 2017—but have also begun to export.[4] Large Chinese gaming studios are also strengthening their global platforms by investing in foreign enterprises such as Riot Games.[5]

Two trends in Chinese consumption present opportunities for further integration between China and the world

Given the momentum in China's consumption growth and links between China and the world in consumer sectors, trends in Chinese consumption could have large consequences for both domestic and foreign businesses. We highlight two trends that could lead to more integration of consumption value chains between China and the world.

1. Chinese consumers are looking for more choice, tend to trade up, and are enthusiastic about foreign brands

Chinese consumers are looking for more choice and for higher-quality goods and services. Regular McKinsey surveys in China—and indeed the spending patterns of Chinese tourists overseas—consistently indicate a desire among Chinese shoppers for higher-quality products and services, which Chinese companies do not always provide. In McKinsey's 2015 China Consumer Survey, which canvassed 10,000 consumers, more than 50 percent of respondents said that they were willing to trade up to premium offerings in fast-moving consumer products such as cosmetics, spirits, and oral care. About 60 percent of respondents said that whether a product is a famous brand or organic is an important factor they consider when buying food and beverages.[6]

1 Jason Mander, *WeChat rises to become the fastest growing messaging app in the last year,* Global Web Index, May 16, 2014; and Thomas Graziani, *WeChat outside China: What are the growth opportunities?* Walk the Chat, May 10, 2015.
2 Mansoor Iqbal, *TikTok revenue and usage statistics (2019),* Business of Apps, February 27, 2019.
3 Tom Wijman, *Mobile revenues account for more than 50% of the global games market as it reaches $137.9 billion in 2018,* News Zoo, April 30, 2018.
4 Allen Peng, *China's most popular mobile game charges into American market,* All Tech Considered, January 2, 2018.
5 Allegra Frank, *Riot Games now owned entirely by Tencent,* Polygon, December 15, 2015.
6 *China's choice: Capturing the $5 trillion productivity opportunity,* McKinsey Global Institute, June 2016.

A "consumption downgrade" among Chinese consumers has received some media coverage, based largely on anecdotal evidence such as increased sales of instant noodles and Chinese pickles, the popularity of shared bikes over taxis, and the rapid rise of Pinduoduo, a discount e-commerce platform.[1] However, downgrading in these instances was partly driven by innovation in channels targeting underserved consumers who are more price sensitive and less brand conscious, and partly driven by "trade-off" behavior. McKinsey's 2018 Global Consumer Sentiment Survey showed that Chinese consumers prefer trading up, compared with other nine top-ten economies by GDP. However, we also note an important change. The same survey in 2016 indicated that the ratio of trade down was negligible in almost all categories. In 2018, the ratio of trade down increased to about 9 percent in some categories. Although this is still lower than in other large economies, it signals the trade-off behavior of Chinese consumers—trading down in categories where consumers feel less value and using the money saved to make purchases in categories that they value more (Exhibit 36).

20%

rise in multinational corporations' market share in the broad baby food category 2008–17

In many categories, including passenger vehicles and baby food, multinational corporations have a market share of above 50 percent. Increasing incomes mean that many Chinese citizens have the money to spend on what many regard as premium foreign brands. Add to this aspirational consumption a lack of confidence in some locally produced goods—and services—and there is a push to be able to buy foreign products. Consumers have concerns about quality in some categories, baby food being an example. A baby formula contamination scandal in 2008 led to an estimated 300,000 victims (including six infant deaths), spurring parents to pay significant attention to quality.[2] The impact of this single (serious) scandal has proved long-lived. Between 2008 and 2017, multinational corporations' market share in the broader baby foods category grew by 20 percentage points. In the McKinsey China 2017 consumer survey, infant milk powder had the highest share of respondents—27 percent—of all tracked categories preferring foreign brands.[3] There is room for China to improve the safety of food and other consumer products more broadly. One report from an inspection specialist noted that 48 percent of Chinese food processing plants failed to meet international safety standards. More recently, a local biotechnology company was found to have administered over 200,000 faulty vaccines to children in 2018. Similar issues have been seen in the case of local manufacturers of herbal supplements.[4]

The desire to buy foreign brands in certain categories coupled with large price differences between China and the global market have created unauthorized channels, leading to a loss of local consumption and poor consumer protection. Such price gaps have led to rapid growth in gray markets and business models known as daigou. In this model, consumers buy goods (predominantly cosmetics but also a wide range of accessories and other premium and luxury goods, as well as commodity items such as milk powder) abroad and resell them, often through well-organized networks, in China. According to one analysis, the daigou trade was directly responsible for a rise of more than 20 percent in South Korea's duty-free sales in 2017 despite a fall of nearly 50 percent in the number of Chinese visitors.[5] One estimate puts the scope of daigou at 300 billion renminbi in luxury goods alone.[6]

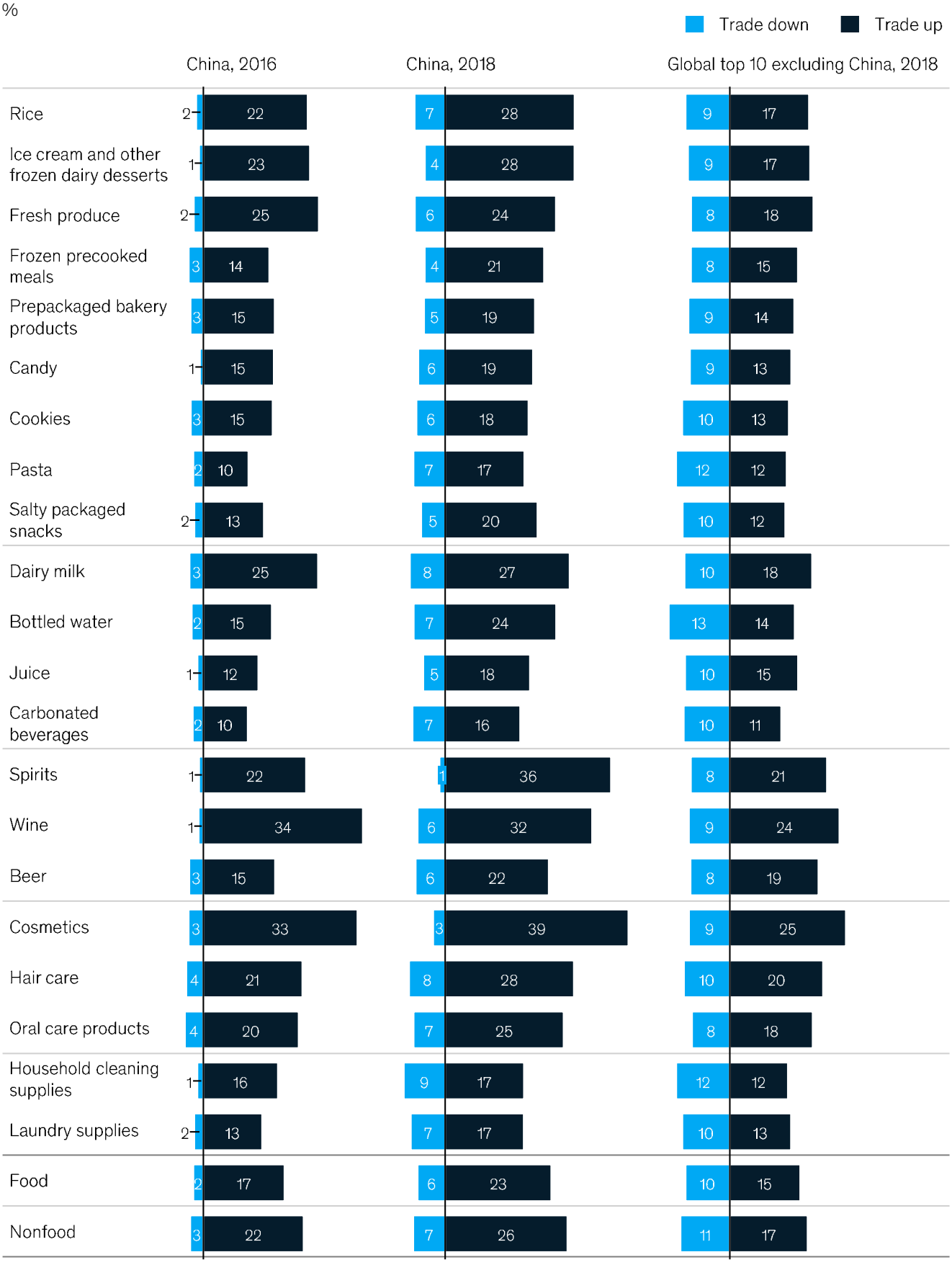
1 Li Yuan, "China's consumption downgrade; Skip avocados, cocktails, and kids," *New York Times,* August 22, 2018; and Nathaniel Taplin "Are China's consumers in trouble?" *Wall Street Journal,* September 24, 2018.
2 Wang Qingyun and Shan Juan, "Millions paid to milk scandal victims," *China Daily,* May 17, 2012.
3 Wouter Baan, Lan Luan, Felix Poh, and Daniel Zipser, *Double-clicking on the Chinese consumer: The new health craze, the rise of the post-90s generation, and other trends worth watching,* McKinsey & Company, November 2017.
4 Phoebe Zhang, "Chinese health product firm Quanjian scandal widens as public anger grows," *South China Morning Post,* January 6, 2019.
5 Martin Moodie, *Daigou dampener: Chinese authorities crack down on travel retail's 'shuttle traders',* Moodie Davitt Report, October 8, 2018.
6 Jiaqi Luo, "China's 300-billion daigou business: What's next after the government crackdown?," *Luxury Society,* October 31, 2018.

Exhibit 36

Trade-off behavior is emerging in some categories in which Chinese consumers are becoming more sophisticated.

Trade-off rates in the past year among those who changed buying behavior, 2018,[1]

%


Trade down
Trade up
China, 2016
China, 2018
Global top 10 excluding China, 2018
Rice 2 22 7 28 9 17
Ice cream and other frozen dairy desserts 1 23 4 28 9 17
Fresh produce 2 25 6 24 8 18
Frozen precooked meals 3 14 4 21 8 15
Prepackaged bakery products 3 15 5 19 9 14
Candy 1 15 6 19 9 13
Cookies 3 15 6 18 10 13
Pasta 2 10 7 17 12 12
Salty packaged snacks 2 13 5 20 10 12
Dairy milk 3 25 8 27 10 18
Bottled water 2 15 7 24 13 14
Juice 1 12 5 18 10 15
Carbonated beverages 2 10 7 16 10 11
Spirits 1 22 1 36 8 21
Wine 1 34 6 32 9 24
Beer 3 15 6 22 8 19
Cosmetics 3 33 3 39 9 25
Hair care 4 21 8 28 10 20
Oral care products 4 20 7 25 8 18
Household cleaning supplies 1 16 9 17 12 12
Laundry supplies 2 13 7 17 10 13
Food 2 17 6 23 10 15
Nonfood 3 22 7 26 11 17

Source: McKinsey Consumer Sentiment Survey; McKinsey Global Institute analysis

The next frontier for competition and quality upgrades is services. As in some goods, Chinese consumers are not always happy with domestic offerings. In some services, we have seen some higher-income citizens opt for offerings from foreign players. Foreign participation is still limited, but we are now seeing government initiatives open up services. Nevertheless, there is scope for further integration of Chinese services with global value chains (see chapter 5 for further discussion). Here we look at two fast-growing Chinese services sectors: healthcare and education.

Healthcare

Chinese citizens are more concerned than ever with their health and fitness. In the McKinsey China 2017 consumer survey, 65 percent of respondents were seeking ways to lead a healthier lifestyle.[1] Yet China's healthcare system has a shortage of capacity. For every 10,000 people, the system has approximately 19 doctors and 25 nurses (compared with 27 doctors and 129 nurses in the United States), according to NHFPC data.

800

Chinese drugs reviewers in 2017 vs

70

in 2015

There are also some quality gaps, which the Chinese government has been seeking to address through reforms of domestic healthcare provision. In pharmaceuticals, for instance, China has reformed its drug approval processes to shorten schedules and reduce the amount of time for a drug to be approved in China after it has been approved elsewhere. China increased the number of drug reviewers from 70 in 2015 to more than 800 at the end of 2017, put in place a priority review process for drugs for critical conditions, and reduced the time it takes to approve process changes in clinical trials.[2] Post-reform, treatments for anemia and bowel cancer have gone to market in China before the United States and Europe.[3] Chinese patients are now obtaining treatment for diseases such as hepatitis C that was not available before.[4]

Recognizing the role that foreign providers can play in bringing know-how to hospital management, innovative treatments, and clinical care, the Chinese government has taken some steps to open up the healthcare services sector to foreign participation. China is now allowing wholly foreign-owned hospitals and facilities to operate in seven provinces (in all other areas, foreign players are limited to joint venture agreements with local partners in which their equity ownership is capped at 70 percent). In 2017, the government issued "opinions on encouraging development of diverse private healthcare services" to encourage private (foreign and local) investors to participate in Chinese healthcare services by offering preferential treatment.[5] However, restrictions still exist on foreign-owned establishments, including a minimum capital commitment of 20 million renminbi. There are also operational barriers that may discourage international players from participating in the Chinese market. For example, different healthcare payment standards can cause confusion for foreign operators. Permits for foreign doctors last only one year. The ambiguous nature of standards for foreign-owned hospitals can also stall progress. The specific standards and measures that foreign hospitals have to follow are still unclear.[6] To qualify for reimbursements from public insurance, foreign hospitals also have to follow pricing controls on certain services.[7]

1 Wouter Baan, Lan Luan, Felix Poh, and Daniel Zipser, *Double-clicking on the Chinese consumer: The new health craze, the rise of the post-90s generation, and other trends worth watching,* McKinsey & Company, November 2017.
2 Alistair Davidson, Kirsten Messmer, and Bill Wang, "China regulatory reform: An update on review timelines and drug lag," *Regulatory Focus,* May 2018.
3 "China first to approve AstraZeneca, FibroGen anaemia drug," Reuters, December 18, 2018.
4 *Checking up on China's healthcare system,* China Investment Conference, Credit Suisse, October 23, 2018.
5 Quian Zhou, ed., "China's healthcare reforms underscore market growth," *China Briefing,* February 19. 2018.
6 Elizabeth Leclaire, "China allows wholly foreign-owned hospitals: A year on," *China Briefing,* July 10, 2015.
7 Sabirina Luk, "The politics of drug price control policy in China: Regulation, deregulation, and re-regulation," *Journal of Contemporary East Asia Studies,* 2015.

Education

Public schools are major providers of education in China. Public education is characterized by an intense test-taking culture that prioritizes rote memorization over critical thinking. In a labor market that is shifting dramatically due to digitization and automation, this approach may become less fit for purpose. Already we see that demand for alternative education models is buoyant and increasing. Enrollment in private primary schools increased from 6.0 percent of all students in 2013 to 7.3 percent in 2016, and is expected to grow to 8.9 percent in 2020. Enrollment in private secondary schools increased from 9.8 percent in 2013 to 11.2 percent in 2016, and is expected to grow to 13.8 percent in 2020.[1]

Despite evident demand for alternative education models in China, the supply is relatively limited, due to stringent regulations on the types of schools that can be set up and enrollment requirements. Licenses to operate international schools or even international divisions of Chinese schools tend to be difficult to obtain; the application can take years. More importantly, enrollment in international schools or divisions is limited to non-Chinese nationals, creating an environment that segregates foreign and Chinese students.

An opportunity exists to allow more foreign participation in Chinese education and changing enrollment requirements for public, private, and international schools. The move toward a more globalized education system would not be unique to China; Asian countries including Singapore and Vietnam have announced reforms to increase foreign participation in their education sectors, including encouraging foreign investment and collaboration in postsecondary education.

A system in which foreign and local students learn together could help to create a globally competitive school system. The 608,400 Chinese students who went abroad in 2017 contribute to China's deficit in services trade, and a useful by-product of more foreign students coming to China would be to narrow that gap. Like Australia, Canada, the United Kingdom, and the United States, China could become an important exporter of education. Consider, for instance, that Australian education exports to China amounted to 10 billion Australian dollars in 2017, after 21 percent growth per year since 2013.[2] Just as the number of Chinese students studying abroad has increased over the past decade, so has the number of inbound foreign students to China, although on a smaller scale. Today, 489,000 students travel to China each year for education. With better infrastructure in place that encourages greater sharing of facilities and classes catering to both Chinese and foreign students, China can become a destination for students seeking alternatives to a Western-focused education system.

2. A rising number of Chinese people go abroad and spend more

China's increasing flows of people—particularly tourists—is an expanding business opportunity for retailers in destination countries. China is already the largest source of outbound tourists in the world (Exhibit 37). In 2017, Chinese tourists made more than 140 million trips and spent $265 billion; to put that spending in context, US tourists spend $168 billion on foreign travel. Spending by Chinese tourists as a share of worldwide tourism spending has soared from 6 to 22 percent in just ten years and is forecast to reach about 30 percent by 2028, equal to spending by European tourists and just short of spending by tourists from North America and the rest of Asia combined.

22%

Chinese share of worldwide tourism spending from

6%

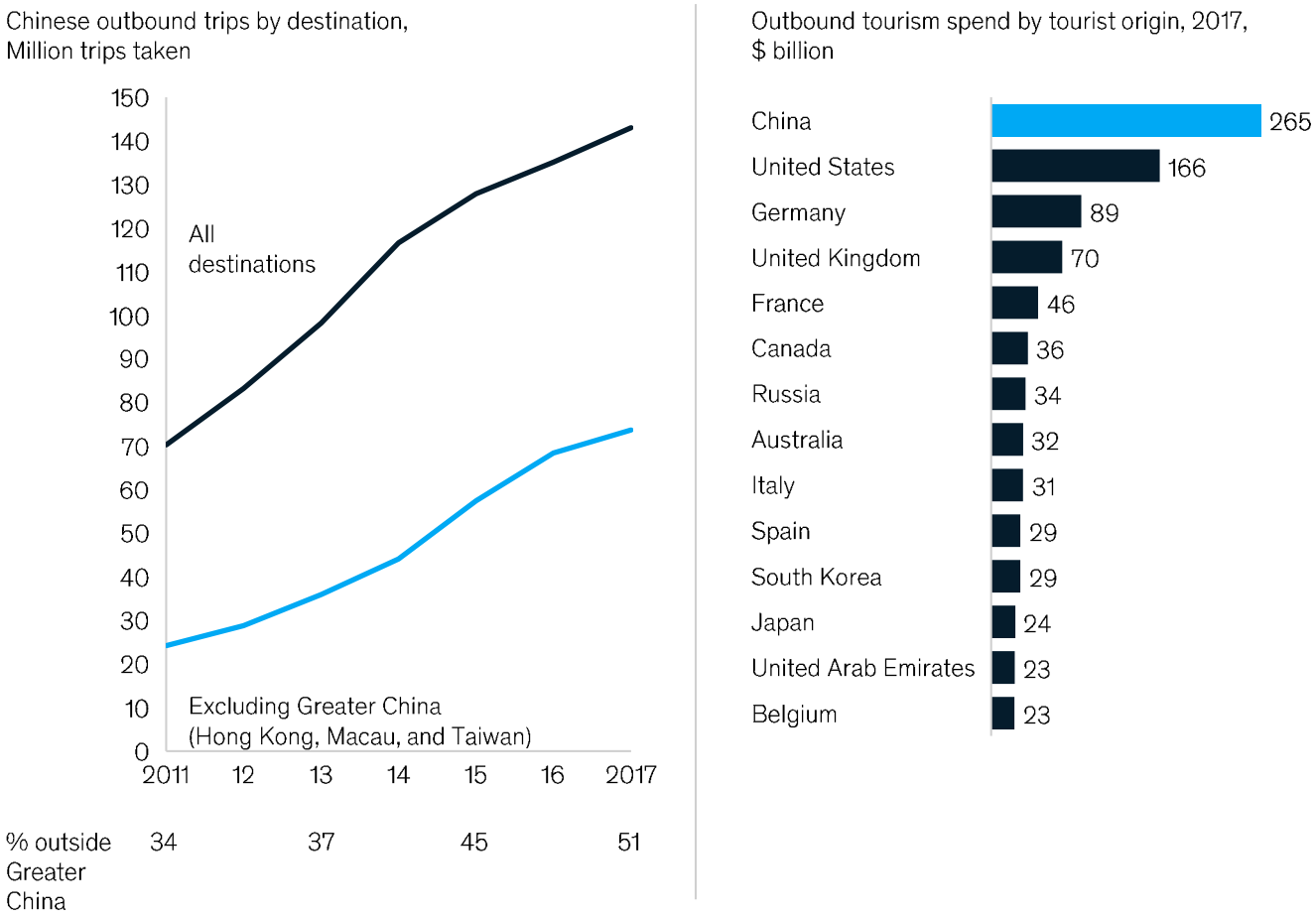
only ten years ago

[1] Russell Flannery, "Why the private education market in China will outperform in the next decade," *Forbes*, March 25, 2018.
[2] Australian Bureau of Statistics.

Historically, Chinese tourists have focused on travel to other parts of Greater China (Hong Kong, Macau, and Taiwan), but the share of tourism by Chinese citizens outside Greater China increased from 34 percent of all trips in 2011 to 51 percent in 2017. As Chinese tourists have become wealthier, they are traveling further, going for more high-end options, and spending more.

Exhibit 37

China is already the world's largest source of tourists—most to Greater China—but increasingly they are visiting other destinations.



Source: World Travel and Tourism Council; Hong Kong Census and Statistics; MOTC (tourism bureau), Taiwan; Macao tourism data; McKinsey Global Institute analysis

A large opportunity is available to tap. Chinese tourism is highly geographically concentrated. Today, 84 percent of outbound tourism spending occurs in Asia Pacific (including Hong Kong, Macau, and Taiwan, as noted). Spending by Chinese tourists is equivalent to 9 percent of private consumption in Thailand, 7 percent in Singapore, 2 percent in South Korea, and 1 percent in Japan (Exhibit 38). In contrast, spending by Chinese tourists outside Asia Pacific remains fairly low at about 15 percent of total outbound spending in 2017 (although that share is higher than the 12 percent recorded in 2012). The capacity to meet this demand for Chinese tourism to a wider range of destinations is rising. For instance, as of early 2019, four Chinese airlines had applied for additional routes to Italy, which, if approved, would increase the weekly frequency of Italy-bound flights by 24 trips.[1] Such destinations can expect Chinese tourism spending to grow.

Destination countries can do more to cater to Chinese tourists. In Asia Pacific, businesses have already started to adapt to their needs, for instance by accepting Chinese digital payments. As of 2018, 50,000 South Korean stores offered Alipay as a payment option, and average users spent about 8,330 renminbi.[2] In Singapore, about 75 percent of taxis accept Alipay.[3] In Japan, upscale malls such as Ginza Six and Tokyo Midtown now offer duty-free exchanges for Chinese tourists, and they have Chinese-language signage, pamphlets, and announcements.[4] In August 2018, Thailand introduced special immigration lanes for Chinese tourists, and the tourism ministry is considering a proposal that would grant Chinese tourists free double-entry visas.[5] One survey found that after Serbia eased visa restrictions for Chinese tourists (the first Eastern European country to do so), visits increased by 350 percent in the first half of 2018.[6]

84%

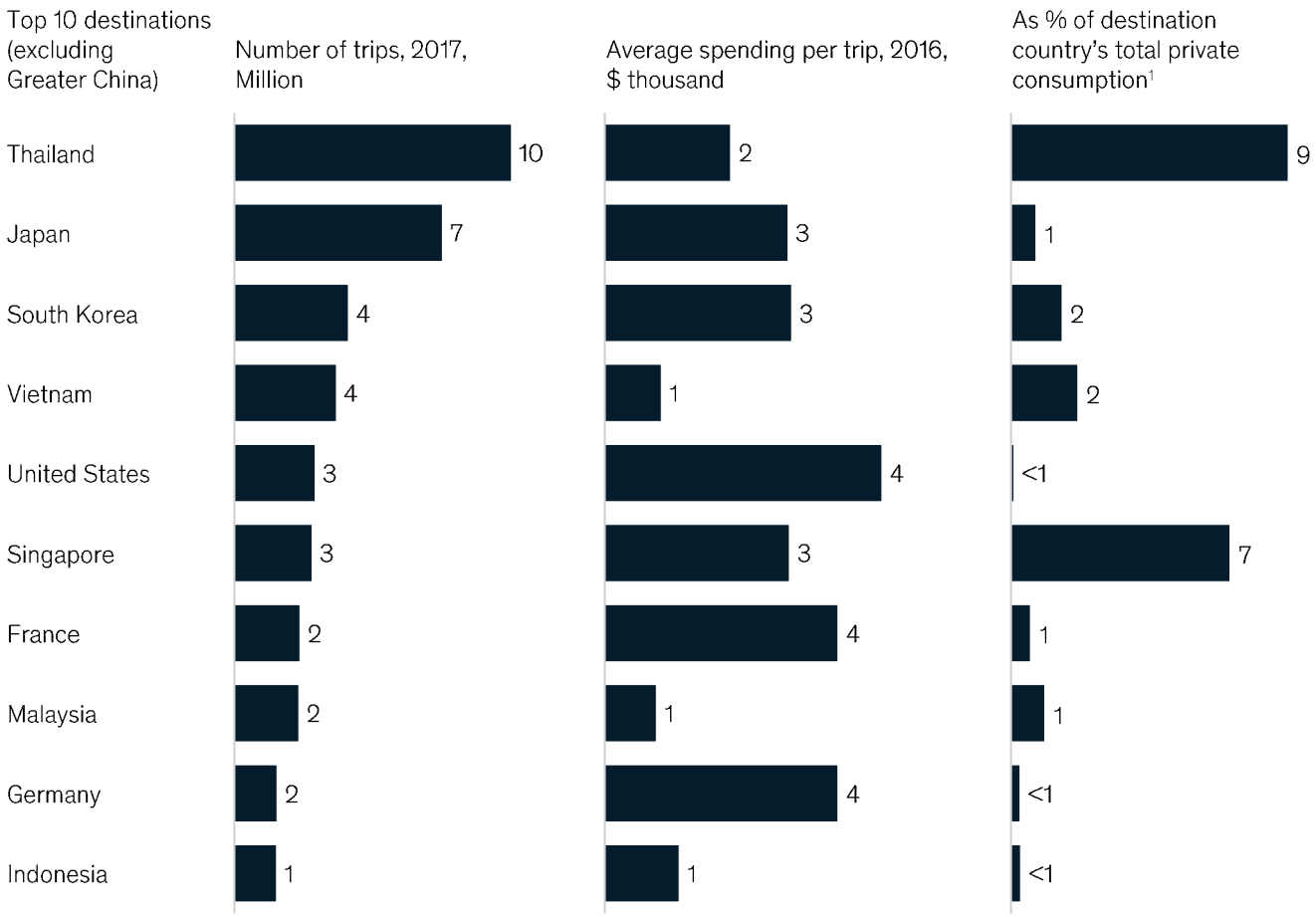
of spending by outbound Chinese tourist occurs in Asia Pacific

The quality of China's travel industry in supporting outbound tourism could be improved. Virtually all trips abroad by Chinese citizens are arranged by local companies, and Chinese tourists tend to prefer to travel with tour groups. McKinsey research finds that close to 50 percent of all trips to Southeast Asia and Europe were package trips, while 20 percent of trips to North America relied on local tours at the destination.[7] Often the emphasis of these tours is rather narrowly on shopping opportunities rather than broader experiences including cultural and historical sightseeing, but Chinese consumers are demanding more. The same research in 2018 highlighted a number of myths about Chinese tourists, including the assumption that they mainly travel to shop, whereas they actually prefer experience-based travel. Another myth is that Chinese tourists are interested only in eating their own local cuisine; they show significant interest in fine dining. Demand for tailor-made tours is rising, and Chinese startups offering bespoke packages are proliferating.[8]

1 Gordon Orr, *Chinese airlines are vastly expanding their flights to Europe this year,* LinkedIn, February 7, 2019.
2 "Korea among top spending destinations for Alipay," *Korea Herald,* September 3, 2018.
3 *Alipay to be made available in Seoul taxis via kakaopay,* Finextra, October 23, 2018.
4 Andreas Neuenkirchen, *Lower Chinese retail spending necessitates creativity for Tokyo's Hibiya Midtown,* Jing Travel, April 5, 2018.
5 "Thailand tries to lure Chinese tourists with dedicated immigration lanes," Travel Wire News, August 10, 2018.
6 Zigor Aldama, "Ctrip is not only bringing the world to Chinese tourists, the online travel agent is changing the industry too," *South China Morning Post,* December 31, 2018. Also see *How China's largest online travel agency connects the world: An interview with Ctrip CEO Jane Sun,* McKinsey & Company video, February 2019.
7 *Chinese tourists: Dispelling the myths,* McKinsey & Company, September 2018.
8 Coco Liu, "Customised travel: The next big thing for Chinese tourists?" *South China Morning Post,* January 21, 2017.

Exhibit 38

Spending by Chinese tourists abroad can have a significant economic impact on top destinations.



[1] Indicative figure to gauge the relative size of Chinese tourist spending (cannot be directly counted as GDP).

Source: Euromonitor; Nielsen; Vietnam National Administration of Tourism; Statistics Indonesia; Tourism Malaysia; IHS Markit; McKinsey Global Institute analysis

Many of China's tour operators are online businesses, and after a boat carrying Chinese tourists capsized off the coast of Phuket in July 2018, the Ministry of Culture and Tourism began an investigation into the travel market with a view toward drafting new legislation to raise safety standards specifically and quality more broadly.[1] Just after the accident, the ministry issued a notice requiring local authorities to investigate online travel platforms and remove any tour products that were found to be substandard.[2] There is some evidence of customer dissatisfaction with Chinese travel agents.[3] One way to help improve the quality of offerings may be to ease restrictions on foreign travel agencies operating in China. In 2016, the Beijing Municipal Commission of Tourism Development announced a pilot plan for joint ventures between foreign and domestic travel companies to provide outbound tours (except to Taiwan).[4] That same year, Japanese-owned Kinki Nippon Tourist established a joint venture in Shanghai with a local company as part of a move to increase Chinese tourism to Japan.[5] In 2018, UK travel agency Thomas Cook formed a joint venture with Fosun Tourism Group in Hainan. And wholly owned foreign travel agencies operating out of China may be on the way.[6]

Higher-quality offerings by China's tourism industry could help to increase the number of inbound tourists from overseas and broaden the number of destinations they visit. Today, trips taken by foreigners tend to be highly concentrated in certain areas of China. The province of Guangdong and Shanghai alone account for 23 percent of all inbound international trips (excluding tourists from Hong Kong, Macau, and Taiwan) to China, for example, and the top seven province-level destinations account for over half, according to data from the National Bureau of Statistics. China can encourage tourism in less traveled parts of the country through package tours, infrastructure investment, and subsidies, thereby stimulating growth in those areas.

• • •

China's consumer sector, which has strong momentum, is already relatively integrated in global value chains, but it carries more potential. In the next chapter, we look at the potential value at stake from less engagement between China and the world in integration in global value chains, and deeper engagement enabled by more Chinese reform in key areas of the domestic economy.

1 Xu Wei, *China will eliminate substandard tour products,* Yicai Global, July 9, 2018.
2 "China prepares unprecedented online tourism regulation," Bloomberg News, September 28, 2018.
3 Sarah Zheng, "Chinese tourists ripped off by country's oldest travel agency, undercover report claims," *South China Morning Post,* June 18, 2018; and Julie Makinen, "Strong-arm tour guides force Chinese tourists to shop," *Sydney Morning Herald,* October 24, 2015.
4 "Joint-venture agencies with foreign capital to conduct outbound tours," *China Travel News,* May 26, 2016.
5 "Japan travel agencies targeting Chinese tourists on their turf," *Nikkei Asian Review,* December 31, 2016.
6 Melissa Cyrill, "China's outbound tourism market: New opening proposed for foreign investors," *China Briefing,* November 15, 2018.

5 The potential value at stake from less and more engagement

Greater economic flows between China and the rest of the world have created many benefits. Previous MGI research has pointed to the economic advantages of cross-border flows that add up to $450 billion of global growth every year, and has highlighted the fact that economies with more global connections experience up to 40 percent more benefit from those connections than less connected economies.[1]

China's adoption of a market-based system and the opening of its markets to foreign investment has been a critical pillar of reform since 1978. Foreign companies have expanded their presence in China enormously. Between 2000 and 2017, the number of foreign-funded enterprises operating in China increased from 203,000 to 540,000; at the end of this period, the firms employed about 14 million workers, up from only three million. They account for 43 percent of China's exports. China's "factory of the world" would not function without, for example, semiconductors and airplanes from the United States and Europe, battery inputs and optical devices from Japan and South Korea, oil and gas from the Middle East and Russia, copper from Chile, or iron and coal from Australia.

For the rest of the world, consumers use products manufactured in China. Knowledge-intensive sectors around the world, from EVs and renewable energy to smartphones, would not be able to function without China's supply of rare earths and solar panels. Chinese imports have reduced consumer prices. For example, it is estimated that Chinese imports have cut the US Consumer Price Index by an estimated 27 percent.[2] China has offered multinational corporations large opportunities for cost-effective manufacturing and fast-expanding consumer markets.

China and the world appear to be reevaluating their relationship

Despite the economic benefit of increased flows, the costs and benefits of globalization are increasingly debated across the world, and protectionist tendencies are on the rise. In the specific case of China's relationship with the rest of the world, for some time now, concerns have been expressed about the "China shock" displacing manufacturing jobs in advanced economies such as the United States.[3] One study estimated that at least two million US manufacturing jobs were displaced between 1999 and 2011, a period when imports from China were surging.[4] Academics note that automation technologies have also played a role.[5] Today, there are indications that some governments are reevaluating the role China plays in the global economic system. A 2018 report by the United States Department of Defense highlighted the rising challenge of Chinese industrial policies as a specific threat to US IP and economic security.[6] Similarly, the European Commission highlighted China as an "economic competitor."[7]

1 *Global flows in a digital age: How trade, finance, people, and data connect the world economy,* McKinsey Global Institute, April 2014.
2 Lawrence J. Lau and Junjie Tang, *The impact of U.S. imports from China on U.S. consumer prices and expenditures,* IGEF working paper number 66, April 30, 2018.
3 David H. Autor, David Dorn, and Gordon H. Hanson, "The China shock: Learning from labor market adjustment to large changes in trade," *Annual Review of Economics,* 2016, Volume 8.
4 Daron Acemoglu et al., "Import competition and the great U.S. employment sag of the 2000s," *Journal of Labor Economics,* 2016, Volume 34, Number 1.
5 Daron Acemoglu and Pascual Restrepo, *Robots and jobs: Evidence from US labor markets,* July 16, 2018.
6 *Assessing and strengthening the manufacturing and defense industrial base and supply chain resiliency of the United States,* Report to President Donald J. Trump by the Interagency Task Force in Fulfillment of Executive Order 13806, September 2018.
7 *EU-China – A strategic outlook,* European Commission and HR/VAP contribution to the European Council, March 12, 2019.

One source of tension between China and its international partners has been Chinese policies promoting the development of domestic capacity and supporting the growth of local players. China's Made in China 2025 industrial development blueprint is an example. This type of industrial policy is not unique. Many governments around the world have been proactive in encouraging growth in local R&D-intensive manufacturing sectors including, for instance, semiconductors. When the US semiconductor industry was in its early stages, government defense and aerospace contracts were a major source of revenue.[1] Japan supported its semiconductor industry as a strategic priority from the 1960s onward, encouraging local procurement for electronics companies, co-investing in large-scale R&D, and providing investment.[2] Similarly, South Korea and Taiwan, which today lead the global memory and foundry segments, both came to global prominence through committed government support. Many governments, including those of Brazil, China, Mexico, and South Africa, have supported the growth of domestic automotive sectors either by allowing multinational corporations to establish local production or by incubating and protecting local players using trade barriers.[3]

However, some policy makers and business leaders in advanced economies, notably the United States and the EU, have voiced concern about Made in China 2025.[4] One report suggested that the United States should emulate Made in China 2025 as a template for a new US industrial policy: "Because MIC2025, in effect, provides a roadmap for industrial competition in the next half decade, US policy can use it in designing a response."[5]

Debate has been increasing about China's status in the world economy and whether China should continue to regard itself as a developing economy and enjoy the related benefits, given its large economic weight and advancement in many areas (see Box 7, "China's status as a developing economy").

1 Daniel Holbrook, "Government support of the semiconductor industry: Diverse approaches and information flows," *Business and Economic History,* Winter 1995, Volume 24, Number 2.

2 Katsuro Sakoh, "Japanese economic success: Industrial policy or free market?," *Cato Journal,* Fall 1984, Volume 4, Number 2.

3 For a general discussion of instance of industrial policy, see *How to compete and grow: A sector guide to policy,* McKinsey Global Institute, March 2010.

4 A 2017 report from the US–China Economic and Security Commission said, "The Chinese government is implementing a comprehensive, long-term industrial strategy to ensure its global dominance…. Beijing's ultimate goal is for domestic companies to replace foreign companies as designers and manufacturers of key technology and products first at home, then abroad." See *2017 annual report,* US–China Economic and Security Commission, November 15, 2017. The European Union Chamber of Commerce in China published a report in 2017 that criticized the Made in China 2025 plan, saying that European business was facing intense pressure to turn over advanced technology in exchange for near-term market access. See *China manufacturing 2025: Putting industrial policy ahead of market forces,* The European Union Chamber of Commerce in China, March 2017.

5 *Made in China 2025 and the future of American industry,* Project for Strong Labor Markets and National Development, US Senate Committee on Small Business & Entrepreneurship, February 2019.

Box 7

China's status as a developing economy

China identifies itself as a developing economy in the WTO (which allows members to use whatever designation they choose). This means, for instance, that it has been given longer to enact WTO agreements and meet commitments.[1] With the designation, China also faces less pressure than developed economies to join multilateral regulatory agreements. For example, China is not bound by contracts such as the Agreement on Government Procurement or the Trade in Services Agreement, while many developed (and some developing) counterparts are.[2] Some observers have said that China has been treated with more leniency when it has not been compliant with WTO commitments such as notifying all subsidies defined in an agreement on subsidies and countervailing measures.[3]

Some Western countries question whether China should receive the benefits associated with being a WTO developing economy and whether its status poses risks to global trade.[4] In some respects, China arguably looks more like a developed than a developing economy. For instance, it has the second-largest GDP in the world. It is home to 3.5 million millionaires, the second-largest national total.[5] Seven of China's provinces, which are home to 350 million people, have surpassed the threshold of $12,000 per capita GDP used by the World Bank to define high-income countries. China is a global technology leader; it spent $293 billion on R&D in 2018, has world-class consumer internet and mobile payment systems, and is a global leader in AI.

China has also achieved substantial development on social dimensions. Life expectancy is 76.25 years, compared with 78.69 in the United States. Adult literacy tops 96 percent.[6] However, other metrics support China's view of itself as a developing economy. Notably, national per capita GDP is about $9,000, well below the OECD average of $44,000. China ranks 72nd on a list of 192 economies in per capita GDP.[7]

1 *Special and differential treatment provisions,* Trade and Development Committee, World Trade Organization, wto.org/english/tratop_e/devel_e/dev_special_differential_provisions_e.htm#legal_provisions.
2 *Agreement on Government Procurement,* World Trade Organization, wto.org/english/tratop_e/gproc_e/gp_gpa_e.htm; and Trade in Services Agreement List of Participants, Office of the United States Trade, ustr.gov/tisa/participant-list.
3 *10 commitments China made when it joined the WTO and has not respected,* Aegis Europe, static1.squarespace.com/static/5537b2fbe4b0e49a1e30c01c/t/568f7bc51c1210296715af19/1452243910341/The+10+WTO+Committments+of+China.pdf.
4 Simon Lester and Huan Zhu, "The WTO still considers China a 'developing nation.' Here's the big problem with that," CNBC, April 25, 2018; and *An undifferentiated WTO: Self-declared development status risks institutional irrelevance,* United States Delegation to the WTO General Council, World Trade Organization, January 15, 2019.
5 Benjamin Stupples, "China is set to keep minting new millionaires faster than U.S.," Bloomberg, October 18, 2018.
6 *Adult literacy rate in China from 1982 to 2015,* Statista, statista.com/statistics/271336/literacy-in-china/.
7 IMF World Economic Outlook Database.

China's foreign investment is being examined closely, particularly in cases involving technology transfer, with national security often cited as a reason. In 2018, the US Foreign Investment Risk Review Modernization Act expanded the jurisdiction of the Committee on Foreign Investment in the United States to noncontrolling foreign investments related to critical technologies, critical industries, and sensitive personal data of US citizens. There have been instances of proposed Chinese mergers with, and acquisitions of, US companies blocked on the grounds of sensitivity around transfer of key technology. For instance, in February 2018, US regulators blocked a $580 million acquisition of a US manufacturer of semiconductor test equipment by a Chinese fund.[1] Outside the technology sector, deals have been blocked in the financial sector, for example.[2] As China's economy continues to grow, such developments may continue.

Tensions between the United States and China have monopolized attention, but strains—and rising protectionism—are not confined to their bilateral relationship. In Europe, the EU has approved a proposal that expands the list of critical sectors to include election infrastructure, biomedicine, and automobiles. It is also increasing its scrutiny of investments made with state influence or technology transfer to third countries. In October 2017, Japan amended its Foreign Exchange and Foreign Trade Act to allow for involuntary divestment of unreported foreign ownership in Japanese companies that may result in national security risks.

Up to $37 trillion of value globally could be at stake by 2040 from choices by China and the world to engage more or less

China and the world are reevaluating their relationship, and rising tensions may even trigger moves to protect and close off at least some parts of domestic economies from globalization. We find that significant value to global economy could be at stake from more or less engagement between China and the world (see the technical appendix for details on our methodology).

We identify five key areas in which China's engagement with the world could increase, creating value. The first opportunity would be China developing itself as an open trading partner and an important import destination. Second, more open Chinese services sectors could broaden the range of options for service providers in the country and boost productivity. Third, a globalized Chinese financial sector could increase foreign participation in China's domestic financial system. Fourth, China could contribute more to global governance and efforts to find solutions to global challenges such as climate change, filling the world's infrastructure gap, and digital and data security. Finally, improvement in the environment for IP and technology investment could expand flows to and from China. These areas all figure prominently in China's domestic reform agenda aimed at driving higher-quality growth for longer-term sustainability. Less engagement in each of these areas could lead to contracted trade volumes, closed services sectors, an inefficient financial system, less potent leadership on tackling global challenges, and decreased global flows of technology.

[1] Alice Woodhouse, "US blocks Chinese takeover of semiconductor equipment company," *Financial Times,* February 23, 2018.

[2] Charles Wallace, "Trump angers China with blocked takeover," *Forbes,* January 3, 2018.

$22t–$37t

of value could be at stake from more or less engagement between China and the world

Both scenarios—more and less engagement—come with upsides and downsides for different stakeholders. For example, in a scenario of less engagement where trade flows with China contract and, in particular, the world imports less from China, alternative suppliers could benefit. Some reports estimate that other countries in Asia, including Japan, Malaysia, Pakistan, and Vietnam, could be "winners" in a trade war between China and the United States.[1] Similarly, diminished technology flows between China and the world could decrease competition in the sector and help global incumbents cement their share in the global market. Conversely, in a scenario of more engagement, China may import more from other countries, which could lead to short-term transitions that have a negative impact on Chinese workers and firms. We recognize that decision makers will consider noneconomic as well as economic factors when making choices about the level of engagement. Different stakeholders' conflicting priorities could add uncertainty to the outlook for the relationship between China and the world.

In this chapter, we focus on how these choices and scenarios—and the outcomes that may result—may play out largely from the perspective of China, but we note that they do not hinge entirely on decisions and approaches forged in China; actions and reactions in the rest of the world will be pivotal, too. Reforming the global trading system to make it more effective at resolving disputes and more inclusive so that benefits from any further opening up of its economy by China can be captured and shared broadly is a collective task.[2] If and when China globalizes its financial sector, the rest of the world would need to be more open to Chinese investment while developing capabilities in project management to take advantage of the greater capital flows that would result. On tackling climate change, all countries need to commit to specific goals and milestones to avoid the Prisoner's Dilemma in which self-interest battles and cooperation can be in opposition to each other.[3] The magnitude of technology and IP flows between China and the rest of the world is subject to policy stances in each country involved in these flows on technology-related investment and national security.

We estimate that action in these five areas could produce significant value to the global economy (including China) by 2040.[4] Conversely, if engagement between China and the world were to decrease, our analysis suggests considerable potential economic downside. In total, we find that the value at stake could be between $22 trillion and $37 trillion of economic value, equivalent to about 15 to 26 percent of global GDP by 2040 (Exhibit 39). A huge majority of this value is in the form of impact on GDP, but there are other types of value, such as higher or lower social costs depending on choices associated with tackling climate change. We note that our estimates of the value at stake are the result of a simulation based on a specific set of conditions and assumptions, and they should not be taken as forecasts. For example, for the scenarios we have made assumptions on how various factors could affect the total factor productivity of the economy. Our analysis is sensitive to the degree of liberalization that would occur in the Chinese services sector, increases in capital productivity as a result of greater financial globalization, and productivity improvements from technology exchange. There are several factors that we have excluded from this simulation including risks associated with political agenda and military interventions. The simulation focuses on long-term impact. We are not attempting to predict the outcome of current debates on trade and tariffs.

1 Alice Woodhouse, "Malaysia may be best placed to benefit from China-US trade war," *Financial Times,* November 20, 2018.

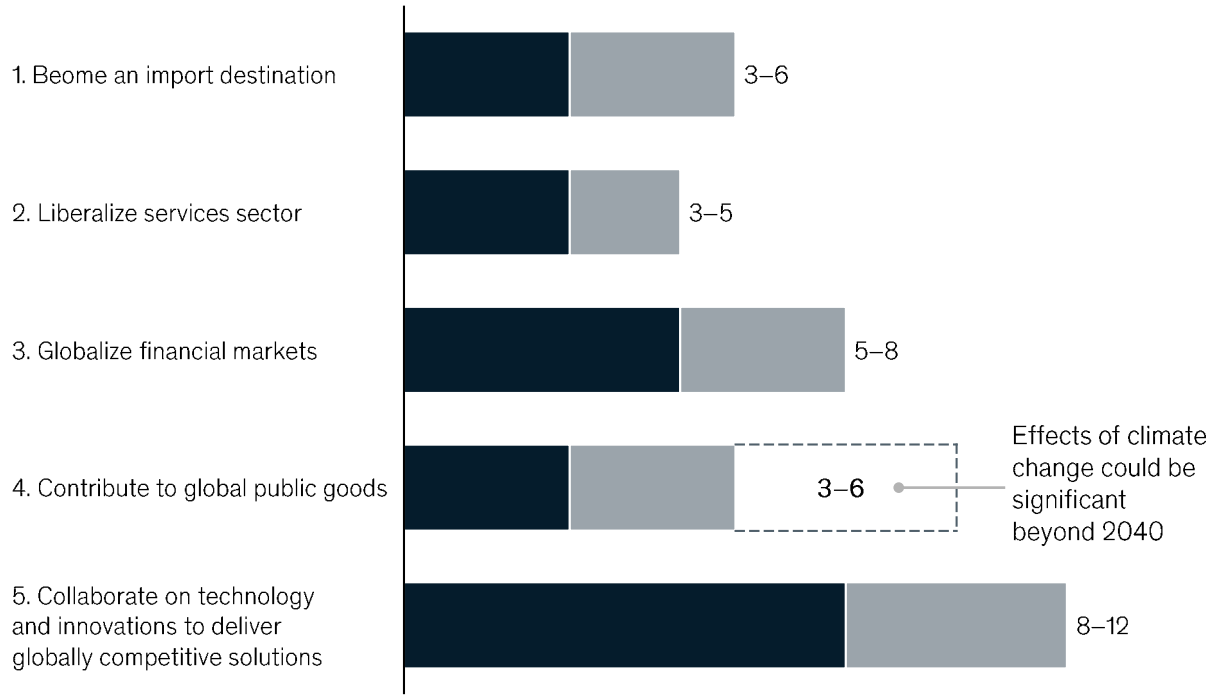
2 Wendy Cutler, *Global trade is broken: Here are five ways to rebuild it,* World Economic Forum, September 12, 2018; and *Current trade and opportunities,* OECD, https://www.oecd.org/trade/understanding-the-global-trading-system/trade-challenges-and-opportunities/.

3 Leda Zimmerman, *What the Prisoner's Dilemma tells us about climate change,* World Economic Forum, June 6, 2018.

4 We simulated the value at stake using three steps: (1) we defined how the degree of less or more engagement will affect economic drivers and what the transmission mechanism will be; (2) we collected and reviewed external research that can serve as reference information to gauge the economic impact of engagement; and (3) we synthesized results from external research using a combination of McKinsey's Global Growth Model (GGM) and external modeling to simulate global GDP in scenarios of less and more global engagement. The two scenarios—less and more engagement—were then compared with a 2040 baseline scenario in the GGM, which uses time-series weighted average trends to build a long-term forecast of the global economy on the basis of current momentum. The difference between the two scenarios and a baseline scenario represents the upside opportunity and downside risk of more and less engagement, respectively. For more details, see the technical appendix.

Exhibit 39

The value at stake from more and less engagement between China and the world is significant.


1. Beome an import destination
3–6
2. Liberalize services sector
3–5
3. Globalize financial markets
5–8
4. Contribute to global public goods
3–6
Effects of climate change could be significant beyond 2040
5. Collaborate on technology and innovations to deliver globally competitive solutions
8–12

Between $22 trillion to $37 trillion of economic value (equivalent to about 15 to 26 percent of global GDP by 2040) could be at stake from less or more engagement between China and the world

Note: Our estimates of the value at stake are the result of a simulation based on a specific set of conditions and assumptions; they should not be taken as forecasts. We used McKinsey's Global Growth Model as the basis for simulation and modeled potential upsides and downsides depending on how more- or less-engagement scenarios affect key economic drivers. The simulation focuses on the long-term economic impact and is not an attempt to predict the outcome of current debates on trade and tariffs.

Source: McKinsey Global Institute analysis

Opportunity 1: China could develop itself as a major destination for imports from both advanced and emerging economies

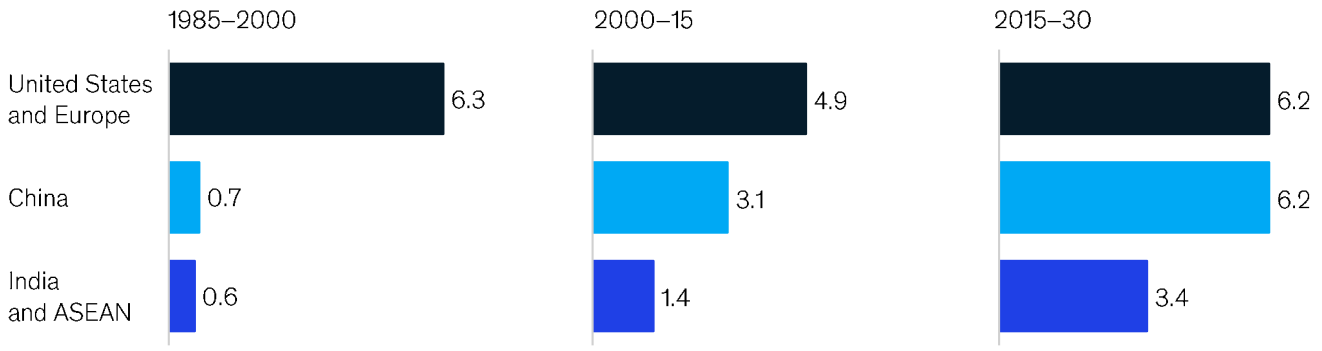
China's consumer market is large and growing and has potential not only to drive domestic growth but to power the global economy. According to consensus forecasts, growth in Chinese consumption in the period to 2030 is likely to be about $6 trillion, comparable with that of the United States and Western Europe combined, and about double that of India and the ASEAN countries combined (Exhibit 40).[1]

[1] Forecasts from McKinsey's Global Growth Model, Oxford Economics, and IHS Markit.

Exhibit 40

China's consumption growth over the next 15 years might be comparable with that of the United States and Western Europe.

Incremental growth in consumption
$ trillion, constant 2016 prices



Source: Oxford Economics; IHS; McKinsey Global Institute analysis

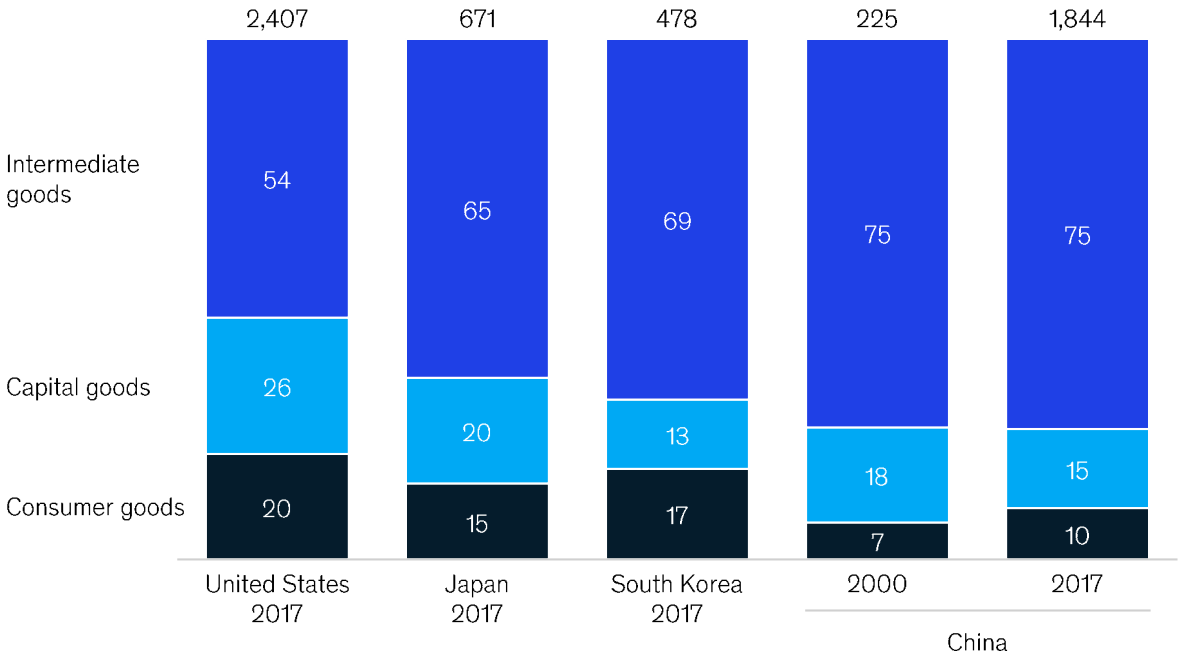
More engagement with China as a trade destination would create greater trade flows. One way to achieve greater trade flow volumes might be for China to import more consumer goods, further enhancing quality and choice for its consumers while providing more opportunity for international players. Overall Chinese imports have increased sevenfold since 2000, but imports of consumer goods have risen more than tenfold. From 2016 to 2017 alone, China's imports of consumer goods grew by as much as those of Japan and South Korea did in ten years. In absolute value, China's consumer-goods imports are now 1.3 times Japan's and nearly triple South Korea's. Nevertheless, China imports fewer final goods than developed countries, as a share of both total imports and total consumption (Exhibit 41).

As Chinese consumers become wealthier and the middle classes expand, there is clearly room for more growth in these shares. Most imports are from Asia and Europe, at 37 and 34 percent, respectively, with the United States accounting for 21 percent. Of total imports, 28 percent is food and another 41 percent transportation and communication. However, other consumption categories have small shares—again, suggesting scope for more growth (see Box 8, "Digital channels can enable growth in cross-border e-commerce").

Exhibit 41

Despite fast-growing private consumption, China imports fewer consumer goods than developed economies do.

%; $ billion



Note: Figures may not sum to 100% because of rounding.

Source: MGI Global Growth Model; McKinsey Global Institute analysis

As China moves up the value chain into higher-value-added industries, it can import more labor-intensive goods from emerging economies. And as its income grows, the consuming classes will import more from advanced economies. China is already the destination for 8 percent of the exports of advanced economies, up from 5 percent in 2007. Fast-growing emerging economies including Bangladesh, Cambodia, Indonesia, Thailand, Uzbekistan, and Vietnam also have been increasing labor-intensive exports to China.

Evidence is already emerging that China is making strides toward being a potential anchor economy for its region and, at the same time, deepening economic links with emerging economies beyond Asia. As China's share of emerging economies' labor-intensive manufactured exports has declined—by 3 percentage points between 2014 and 2016—those of emerging economies have risen: Vietnam by 1.5 percentage points, India by 0.7 percentage point, and Indonesia by 0.4 percentage point.[1] China's trade with emerging economies around the world—China–South trade—rose 11-fold between 1996 and 2016. In comparison, North–North trade increased only twofold.

Growing imports may have a negative impact on manufacturing employment in China—indeed, there is evidence that this is already happening. Employment in secondary industries decreased from 30 percent of total employment in 2012 to 28 percent in 2017 (in absolute numbers, employment in these sectors decreased from 258 million to 209 million people). However, displaced manufacturing employment is being compensated for by growing employment in services. During the same period, employment in tertiary sectors increased from 36 to 45 percent of total employment in China.

[1] *Outperformers: High-growth emerging economies and the companies that propel them,* McKinsey Global Institute, September 2018.

Box 8

Digital channels can enable growth in cross-border e-commerce

Digital technologies are another opportunity for China to boost imports.[1] As e-commerce increases access to the Chinese consumer, micromultinational corporations (small companies or even individuals going global) from both emerging and advanced economies can participate in China's consumption growth.

Cross-border e-commerce offers a rapid and fast-growing channel for Chinese consumers to access goods from overseas through official business channels and without traveling abroad. From 2015 to 2017, cross-border e-commerce retail imports almost doubled to 111 billion renminbi according to iResearch data.

Cross-border platforms can offer opportunities for foreign businesses, especially emerging micromultinationals globalizing through digital means. More than 18,000 brands are available on leading cross-border platforms, such as TMall and JD.com, that foreign sellers have used to enter the Chinese consumer market, sometimes for the first time. Through these platforms, Chinese consumers can access brands in as many as 80 countries. Cross-border B2C e-commerce also has the advantage of enabling smaller retailers to sell directly to consumers rather than in bulk to middlemen. In 2018, eMarketer estimated that 24 percent of China's digital shoppers would make a cross-border purchase in that year, suggesting considerable scope for more growth.[2]

China has already taken steps to encourage e-commerce imports. In 2017, China reduced its tariffs on e-commerce from 17 percent to 12 percent on B2C retailers. In April 2016, the government introduced a new policy that included e-commerce in its tax regime rather than retroactively applying a stamp tax to goods after they are revealed to be goods for sale at customs. China's government now enables B2C retailers to sell to China with zero percent tariffs, and offers a 30 percent reduction in existing consumption tax and VAT. However, this tax advantage currently has a limit of 20,000 renminbi per person per year, and of 2,000 renminbi per item. The idea of these limits is that consumers can enjoy direct access to foreign retailers but, at the same time, avoid costing the government significant tax revenue or severely affecting existing imports by increasing the number of transactions that go through official and regulated means (rather than depending on loopholes). However, the limit on the value of each product that is tax advantaged restricts the variety and price bands available on cross-border platforms. In recognition of this, the Chinese government has adjusted the limits to 5,000 renminbi per item and 26,000 renminbi per person per year, which means that cross-border e-tailers can now export premium and luxury items to Chinese consumers.

1 *Digital globalization: The new era of global flows,* McKinsey Global Institute, March 2016.
2 Deborah Weinswig, "What Chinese consumers want from western retailers (hint: It's not just fashion and technology)," *Forbes,* May 18, 2018.

Conversely, if trade flows between China and the world were to contract, a number of economic drivers could lead to a negative impact on GDP. First, consumers may have to pay higher prices. As we have noted, consumers around the world have enjoyed lower prices (of up to 27 percent in nonoil consumer goods categories in the United States, for example) because of Chinese imports, but this benefit may dissipate in an era of higher tariffs.[1] And the impact on prices may not just come from fewer Chinese imports. Consider, for instance, that 77 percent of China's exports to the United States are intermediate and capital goods used to produce finished goods. Higher tariffs may increase the cost of US production, raising prices for consumers or lowering profits of US companies producing final goods.

540,000

foreign-funded enterprises in China in 2017 vs

203,000

in 2000

Second, the many supply chains that include China could be disrupted. Multinational corporations with substantial Chinese operations and joint ventures between foreign and Chinese firms could be damaged. The total number of foreign-funded enterprises operating in China increased from 203,000 in 2000 to 540,000 in 2017.[2] In that year, they employed around 13 million workers, up from just three million in 2000. About 40 percent of China's exports are from foreign-owned enterprises and joint ventures (Exhibit 42).

Multinational corporations operating in China are already considering a shift in strategy. An American Chamber of Commerce in China survey found that 31 percent of US respondents were already delaying or canceling investment decisions, 18 percent were considering relocating their manufacturing outside China, and 3 percent were thinking about exiting the China market altogether. However, for those companies considering relocating from China, it is not always the case that operations displaced in China will relocate back to the United States. In one 2018 survey, only 1 percent of respondents indicated any plans to establish manufacturing operations in the United States.[3] At the same time, tariffs could increase costs for companies and, by association, consumers. One study estimated that a ten-percentage-point increase in tariffs would lead to additional costs of more than $1,400 per year for certain US households.[4]

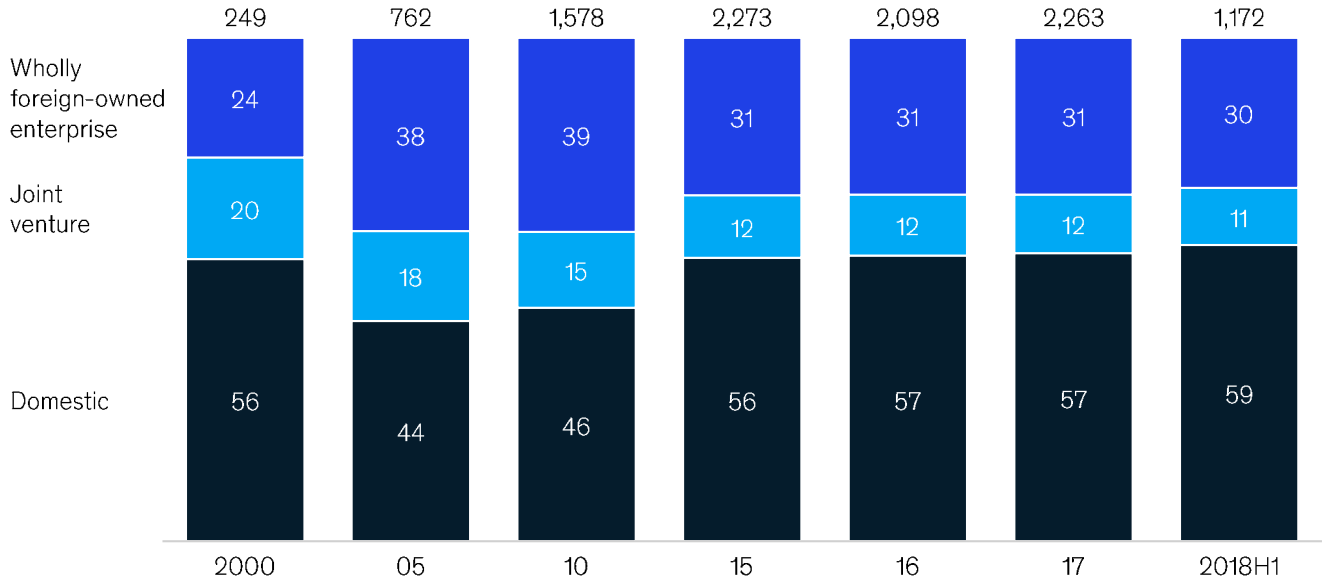
If the US-China trade dispute were to continue, other trading nations would feel the impact (see Box 9, "Learning from the history of trade disputes"). OECD analysis finds that Malaysia, Singapore, and South Korea are highly exposed, with an expected estimated negative impact on GDP of between 0.5 and 1.5 percent due to a US-China dispute. These economies are reacting by making trade deals among themselves and with new partners around the world, and pursuing new business opportunities to benefit from supply-chain relocation. Two examples of new trade deals are the Comprehensive and Progressive Agreement for Trans-Pacific Partnership signed by 11 countries, and the EU-Japan Economic Partnership Agreement, which will affect one-third of global GDP.[5] In the resources sector, which is highly sensitive to Chinese demand, any lessening of integration with China could lead to short-term volatility and price declines. Conversely, China's reliance on iron ore imports could cause a slowdown in manufacturing if critical trade relationships cannot be maintained. Existing inventories of 130 million to 160 million tons amount to about 10 percent of annual apparent consumption.[6]

1 Lawrence J. Lau and Junjie Tang, *The impact of U.S. imports from China on U.S. consumer prices and expenditures,* IGEF working paper number 66, April 30, 2018.
2 Industrial enterprises data from China National Statistics Bureau.
3 John Brinkley, "Trump's China trade war not bringing jobs back to U.S.," *Forbes,* October 30, 2018.
4 Jason Furman, Katheryn Russ, and Jay Shambaugh, *US tariffs are an arbitrary and regressive tax,* Vox, January 12, 2017.
5 Sarah Porter, "A whole new world for free trade?," BBC News, December 28, 2018.
6 Custeel, http://www.custeel.com/reform/more.mv?group=1002003&cat=1002017.

Exhibit 42

China's value chains are global—more than 40 percent of exports come from foreign-owned enterprises or joint ventures.

China exports of goods by enterprise type,
%; $ billion



Source: CEIC; McKinsey Global Institute analysis

In order to address the risks of downside scenarios and capture the upside from the more-engagement scenarios, the world will need to reform aspects of the global trading system which are that is under stress. Some observers argue that all three of the WTO's key functions need to reform: administering multilateral trade rules, acting as a forum for trade negotiations, and providing a mechanism to settle trade disputes. Also up for discussion and agreement is how trade policies should be monitored, and definitions of what constitutes developed and developing economies in WTO.[1] The WTO is an organization that moves forward by consensus among its 164 members, but that consensus is very hard to achieve. One way to tackle this could be a plurilateral agreement with a group of like-minded countries on a new set of rules that serve as an addendum to WTO.[2]

A changing trade relationship between China and the world could put $3 trillion to $6 trillion total value at stake, according to our simulation. Greater trade flows between China and the world could be concentrated in Chinese imports, which could benefit domestic consumption and increase employment in the rest of the world. If current trade disputes persist into the long term, suppressing trade flows, China and the world could experience a negative economic impact.

1 Marianne Schneider-Petsinger, *The path forward on WTO reform,* Chatham House, May 7, 2019.
2 *WTO reform: The beginning of the end or the end of the beginning?* Center for Strategic & International Studies, October 23, 2018.

Box 9

Learning from the history of trade disputes

Trade disputes have existed for as long as nations have imported and exported goods and services, and experience tells us that the negative impact they can have on individual economies, and the global economy, can be significant. Here we highlight just two examples. The first example is the protectionist Smoot-Hawley Tariff Act signed into law in the United States in 1930. The United States was in the throes of rapid industrialization and electrification, and rural areas were facing significant overcapacity and surpluses of agricultural output. The act was designed to protect these communities, and it raised import tariffs on over 20,000 products, the majority of them agricultural, in an attempt to boost consumption of domestic production. However, the act created negative shocks to the US and world economies. Stock market prices dropped immediately after the act was passed. US producers were crippled by high taxes on necessary imported materials. Disruptions in trade patterns led to a 66 percent decrease in imports and a 61 percent decrease in exports. Ultimately, the act became one of the driving forces behind the Great Depression of the 1930s.[1]

The second example comes from Europe. In the 15th to the 18th centuries, the theory of mercantilism took hold, positing that the benefits of trade are solely absorbed by the exporter, and that trade is therefore a zero-sum game. Trade restrictions rose significantly during this period, with far-reaching negative consequences. One was the expansion of the slave trade to support newly created labor-intensive domestic industries.[2] Another was heightened inflation due to depressed cross-border flows of currency and increased government spending to support domestic industries.[3] Third, the policy led indirectly to military conflicts including the Anglo-Dutch and Franco-Dutch wars. Ultimately, mercantilist policies impeded global economic development by neglecting comparative advantages and creating enormous goods surpluses.

1 Cato at Liberty, "The Smoot-Hawley Tariff and the Great Depression," blog entry by Alan Reynolds, May 7, 2016, cato.org/blog/smoot-hawley-tariff-great-depression.
2 C. Robert Haywood, "Mercantilism and Colonial Slave Labor, 1700–1763," *The Journal of Southern History,* November 1957, Volume 23, Number 4.
3 Murray N. Rothbard, "Mercantilism and Inflation" in *An Austrian Perspective on the History of Economic Thought Before Adam Smith, Volume 1,* Cheltenham, UK: Edward Elgar Publishing, 1995.

Opportunity 2: China and foreign players could benefit from liberalization of services

MGI research in early 2019 noted that, in 2017, gross trade in services was $5.1 trillion, far smaller than the $17.3 trillion global goods trade. But trade in services has grown more than 60 percent faster than goods trade over the past decade, and traditional trade statistics do not capture the full role of services. Taking into account the fact that services make up about one-third of the value of traded manufactured goods, large flows of intangible assets that may not be measured unless captured in IP charges, and large cross-border flows of free digital services, MGI found that trade in services may be already more valuable than trade in goods.[1]

Services are a growing part of China's economy, accounting for 52 percent of GDP in 2018, compared with 44 percent in 2010. The value of the healthcare sector, which grew at 12 percent a year during this period, is $479 billion, and the value of education (with 8 percent annual growth) is $500 billion.

1 *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.

Chinese services

4.8x

more restricted than the OECD average

However, as we discussed in chapter 4, China's services sectors are still subject to a range of restrictions, including limits on the participation of foreign players and other operational barriers. According to the OECD's FDI restrictiveness index, Chinese services are 4.8 times more restricted than the OECD average. In the American Chamber of Commerce's 2018 China Business Climate Survey, 46 percent of services firms indicated that foreign companies are treated unfairly compared with local companies, and 29 percent of respondents indicated that allowing firms to "enter business or product segments that are currently restricted" would be significant.

More engagement between China and the world could help develop the services sector and boost productivity. China has already taken steps to open its services sectors to more foreign participation. For instance, it has made efforts to shorten the time needed to approve foreign drugs, removed joint venture requirements for foreign hospitals in certain regions, and allowed a greater share of foreign equity in financial institutions. However, deregulating domestic services and carefully removing barriers to foreign players could help to create competitive dynamics—as deregulation and opening have done in other parts of China's economy—that can raise productivity, boost access, and increase quality.

If China chooses to maintain restrictions in its services sector, this could hamper productivity growth and therefore have a negative impact on the broader economy. Today, labor productivity in China's services sector is estimated to be about 20 to 50 percent of the OECD average, suggesting that reform that raises efficiency would carry a large prize (Exhibit 43). In sectors where productivity is hard to measure, the difference between Chinese and foreign services can be seen in other performance metrics. In healthcare, for instance, only 36 percent of diabetes patients and 42 percent of hypertension patients in China are effectively diagnosed, compared with 76 percent and 85 percent, respectively, in the United States. Treatment rates are even lower. Only 33 percent of diabetes patients and 34 percent of hypertension patients receive treatment in China, compared with 59 percent and 81 percent, respectively, in the United States.[1] A healthcare access and quality index gave China a score of 78 out of a maximum of 100, ranking its healthcare system the 48th most effective in the world.[2]

Differences in quality and access between Chinese and foreign providers do not go unnoticed by Chinese consumers. Some wealthier Chinese citizens have chosen to seek education overseas. China is the world's largest exporter of students. Chinese students studying at US universities and colleges spent $13.9 billion in 2017, while enrollment increased by 7 percent from the previous year. The total number of outbound tertiary students increased from about 580,000 in 2010 to 870,000 in 2017, representing 6 percent growth per year according to United Nations data. In financial services, some Chinese households are putting their money in other economies. In the first half of 2018, mainland Chinese tourists traveled to Hong Kong and spent 22.3 billion Hong Kong dollars on insurance policies and savings schemes.[3]

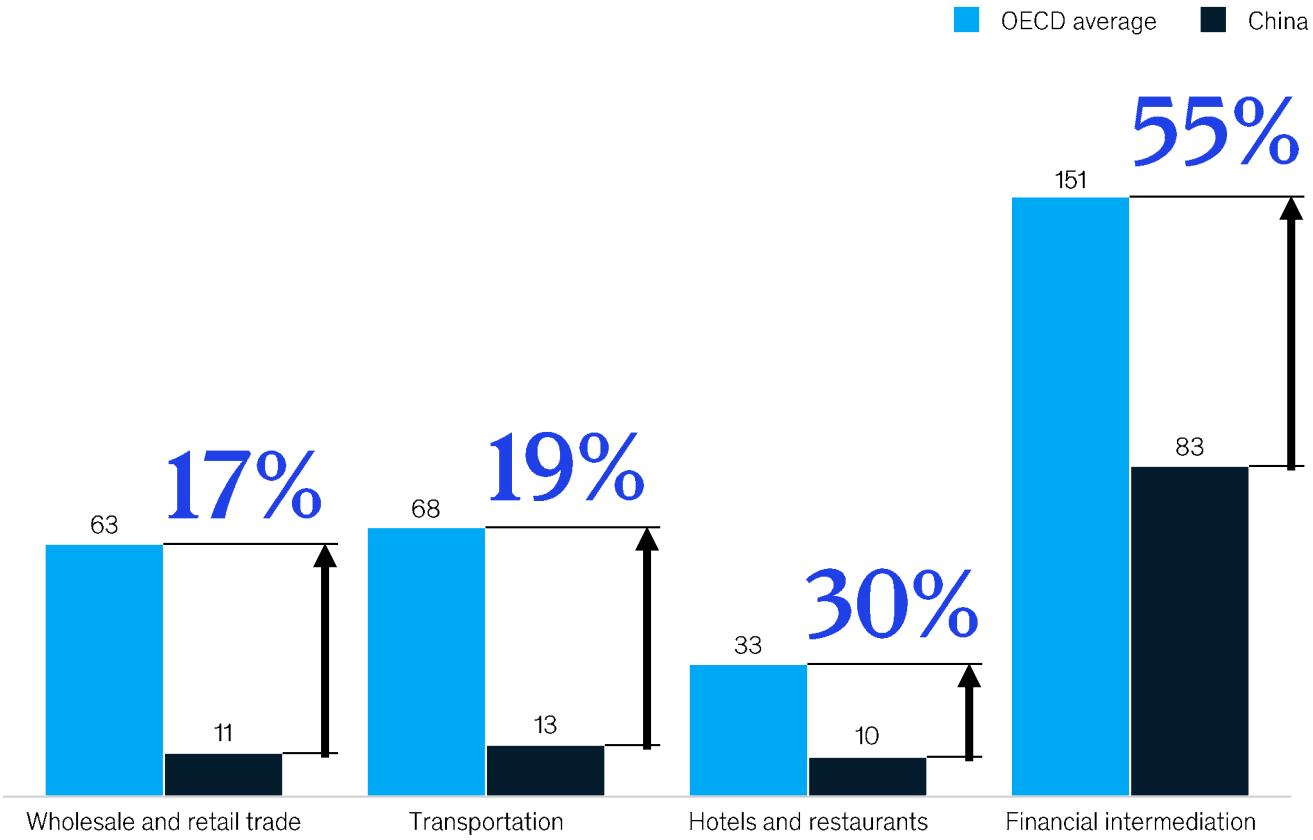
Our simulation indicated that $3 trillion to $5 trillion of value could be at stake depending on global engagement in Chinese services sectors. It would come through greater foreign participation that helps to boost productivity in China and gives players from the rest of the world opportunities in a growing part of the Chinese economy. If China's services sectors were to remain closed, they would continue to operate at a gap with their counterparts in developed economies in both productivity and overall performance, and they may fail to meet rising consumer expectations.

1 *Digital China: Powering the economy to global competitiveness,* McKinsey Global Institute, December 2017.
2 One study estimated that the average drug approval time decreased from 21.4 months before the reforms to 6.8 after. See Nancy Fullman et al., "Measuring performance on the Healthcare Access and Quality Index for 195 countries and territories and selected subnational locations: A systematic analysis from the Global Burden of Disease Study 2016," *The Lancet,* Volume 391, Issue 10136, pp. 2236–71, June 2, 2018.
3 Enoch Yiu, "Fearing further yuan weakness, mainland Chinese are buying insurance policies in Hong Kong once again," *South China Morning Post,* September 29, 2018.

Exhibit 43

China's service sector labor productivity is approximately 20 to 50 percent of the average in OECD countries.

Productivity comparison, 2016,
$ thousand per employee



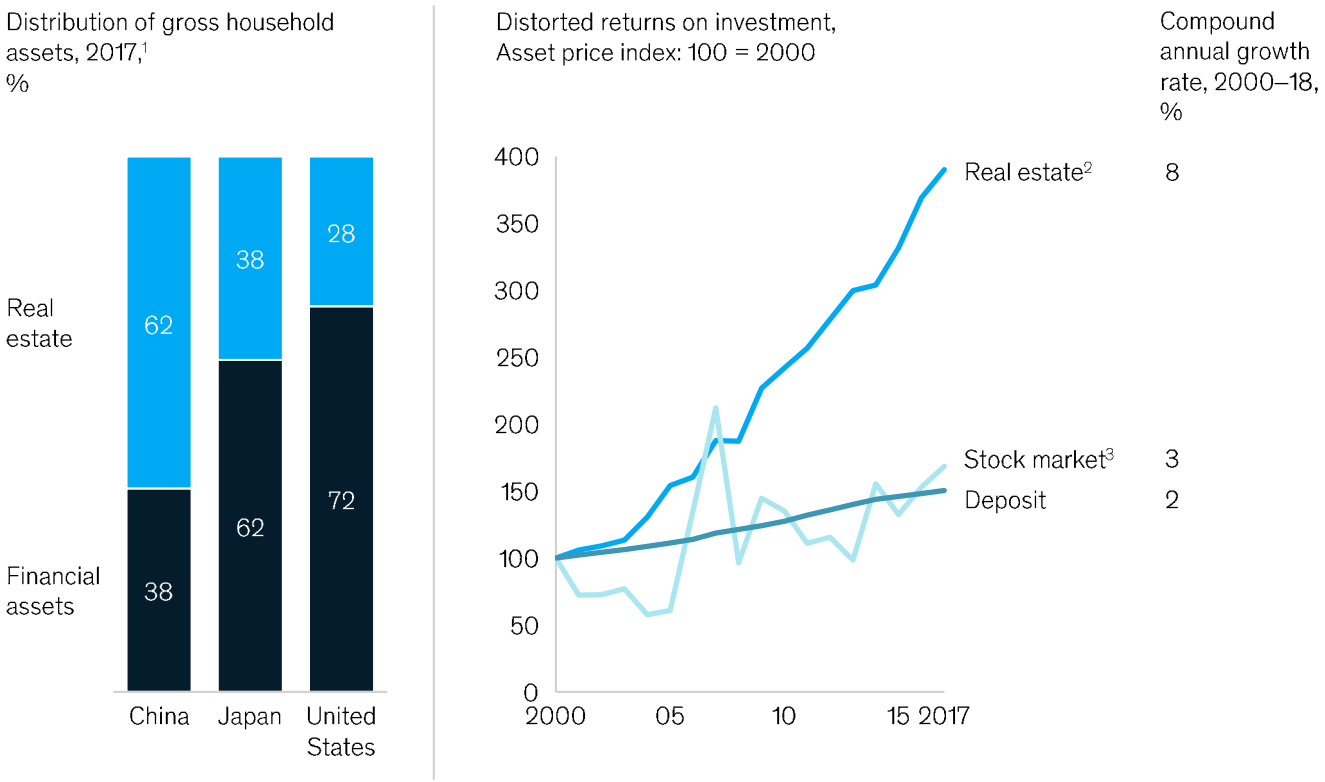
Source: HS; NBS; OECD; McKinsey Global Institute analysis

Opportunity 3: Further globalizing and modernizing the financial system would give Chinese consumers and businesses more choice and allocate capital more efficiently

China's financial system is far from globalized, as noted in chapter 1. This lack of global connectedness contributes to a lack of investment options for consumers and businesses. The portfolio of the average household in China is more highly concentrated in real estate than elsewhere. For instance, 62 percent of its assets are in real estate, compared with 38 percent in Japan and 28 percent in the United States (Exhibit 44). This concentration on real estate in China may have contributed to a rapid rise in property prices. Real estate prices have been increasing at about 8 percent a year while stock market prices have increased by only about 3 percent a year. It has also undermined returns on other assets. In 2012 to 2017, the average rate of return on Chinese financial assets was only 0.4 percent, compared with 3.1 percent in the United States. Currency imbalances caused partly by the accumulation of trade surplus and by continuous injections of liquidity into the domestic financial system while maintaining a closed capital account may have also contributed to real estate price increases and to stock market volatility.

Exhibit 44

Chinese households invest largely in the real estate market, due to lower returns on financial assets.



[1] Excluding debt.
[2] Price based on the national residential average housing price from CEIC.
[3] Stock price is the adjusted closing price of the Shanghai Composite Index at the end of each year; the last date quoted is November 2018.

Source: CEIC: Bloomberg; Credit Suisse Global Wealth Report 2018; PBOC; OECD; World Bank; Moody's; S&P; Yahoo Finance; US Federal Reserve; McKinsey analysis

Over the past three years, the Chinese government has announced changes to existing regulations that signal a trend toward a more liberalized financial services sector. For instance, wholly foreign-owned banks can now operate in China. In the negative list published in 2018, China announced that foreign ownership in securities trading firms and insurance companies can now be 51 percent (previously, only foreign minority ownership was permitted), and the government plans to allow wholly foreign-owned institutions by 2021.[1] The number of qualified institutional investors (those with QFII or RQFII status) increased from 138 in 2012 to 486 in 2018. Requirements for foreign investors in the Chinese stock market have also been loosened, with the lock-up period for strategic investments shortened from three years to one year, and the minimum capital requirement reduced from $100 million to $50 million.[2] In early 2019, Standard & Poor's obtained approval to operate in China, marking the first entrance of a foreign credit rating agency.[3] However, operational barriers and regulatory complexities still remain. Foreign banks need an individual license for each branch. A report by the American Chamber of Commerce in Shanghai notes that frequent informal and sudden changes to policy reduce the ability of US banks to plan (foreign-exchange controls are an example).[4] The chamber also cites ad hoc restrictions on cross-border capital flows, especially for banks specializing in cross-border services. Uncertainty and confusion surrounding Chinese regulations may cause less appetite for foreign participation in the financial services sector.

[1] Dorcas Wong, "How to read China's 2018 negative list," *China Briefing,* July 7, 2018.
[2] Xie Yu, "China relaxes foreign stock investment rules to boost A-share market," *South China Morning Post,* July 30, 2018.
[3] Lianting Tu, "S&P Global gets approval for China local rating business," Bloomberg, January 28, 2019.
[4] *Market access challenges in China,* The American Chamber of Commerce in Shanghai, October 2017, amcham-shanghai, org/sites/default/files/2017-10/Market%20Access%20Challenges%20in%20China%20Final.pdf.

Greater global engagement could lead to increased foreign participation in the Chinese financial system. More integration of China's financial system with global markets could reduce the risk of excess domestic liquidity and relax the constraint of the so-called impossible trinity—that is, simultaneously seeking to control monetary policy, exchange rates, and capital movement. Foreign know-how on risk management could help improve resource allocation and ensure better returns. Opening up would also provide foreign savers new access to a wealth of investment opportunities by allowing direct participation of foreign banks and investment in public markets. Foreign institutions could participate in the $1.1 trillion revenue earned in the Chinese financial services sector, according to IHS Markit data, which grew at 9 percent a year between 2007 and 2017. Foreign savers and capital could benefit from the higher returns made possible by high rates of productivity growth in China. At the same time, China's savers could have more investment options, including in OECD economies that are suffering from a savings gap.

57%

of China's national debt is corporate debt, of which

~70%

is in state-owned enterprises

If China becomes less engaged with the world, however, the shortcomings of, and risks to, the financial system would continue, and perhaps worsen. One area in which to improve today's system is the inefficient allocation of capital.[1] SOEs account for about 70 percent of corporate debt, but they generate only slightly more than 20 percent of industrial output, according to an IMF study. The study also projects that removing zombie companies, reducing overcapacity, and reforming inefficient SOEs could increase total output by 0.7 to 1.2 percentage points.[2] Another risk is that China's domestic debt has more than quadrupled over the past decade, leaving the economy vulnerable to speculation, excess liquidity, and the risk—eventually—of a financial recession. China's debt has been rising, from about 120 percent of GDP in 2007 to around 250 percent in 2018; 57 percent of national debt is corporate debt, of which about 70 percent is in SOEs that have only 30 to 50 percent the return on assets of private companies (Exhibit 45).

Even if China globalizes its financial system, the rest of the world would also need to open up more to Chinese investment in order to capture the benefits of greater engagement. Countries will no doubt need to make decisions about how to use Chinese investment in a way that is consistent with their national interest in, for instance, plugging savings gaps, creating local employment, promoting healthy competition, and gaining access to China's capital markets. Foreign financial services companies will also need to strengthen capabilities so that they can assess the changed nature of opportunities and risks from a more open Chinese financial sector, as well as navigate regulatory and operational barriers if they choose to expand their business in China.

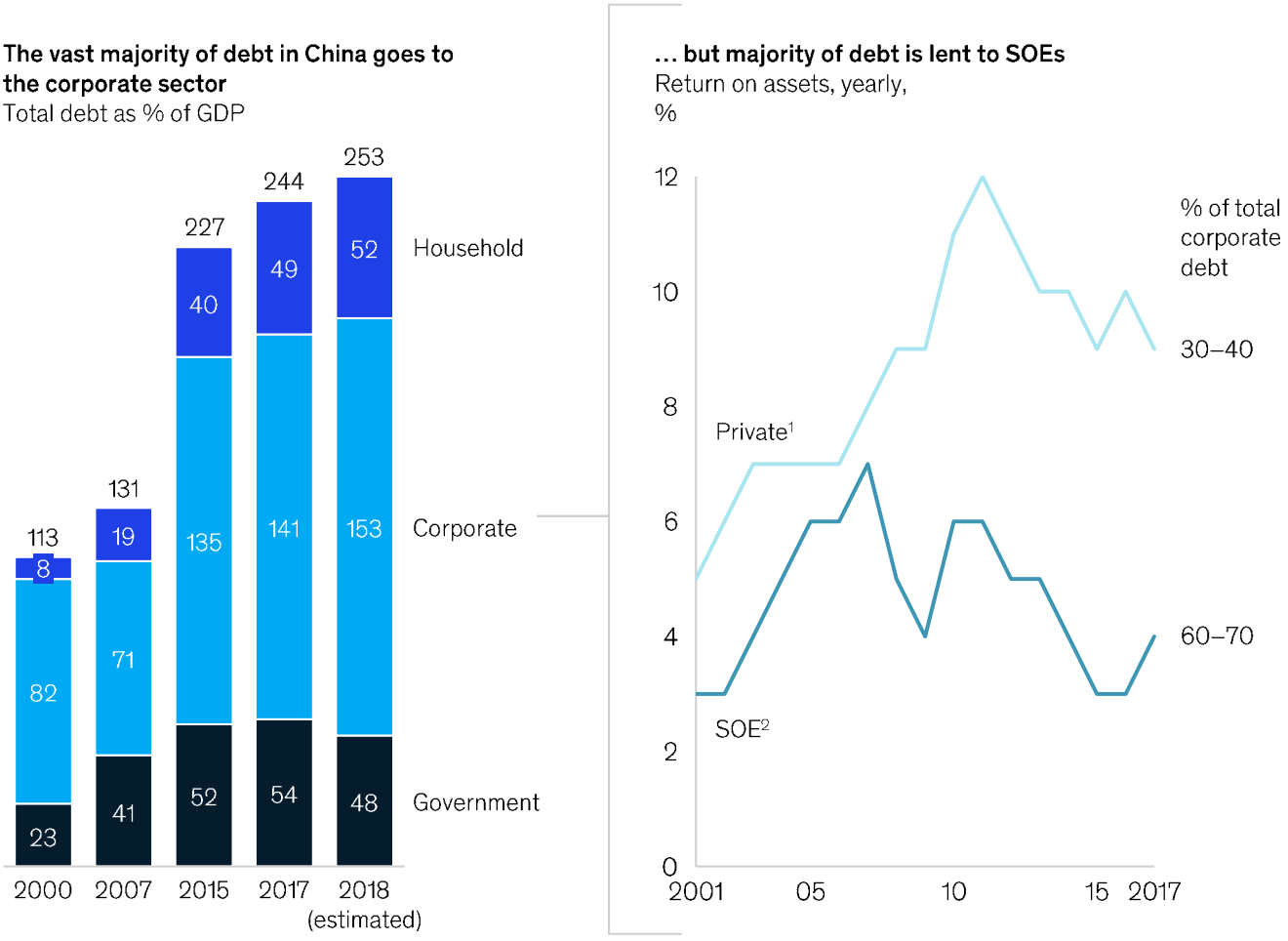
The simulation suggests that $5 trillion to $8 trillion could be at stake in China's financial system in the period to 2040, according to our simulation. A modernized Chinese financial system could lead to capital productivity improvements. Conversely, if China does not modernize its financial systems, continued capital misallocation and increased volatility could lead to a higher cost of capital and slowing capital productivity growth.

[1] Nicholas R. Lardy, *The State Strikes Back: The End of Economic Reform in China?*, Washington, DC: Peterson Institute for International Economics, January 2019.

[2] W. Raphael Lam et al., *Resolving China's zombies: Tackling debt and raising productivity,* International Monetary Fund, November 27, 2017.

Exhibit 45

Corporate debt is growing rapidly, and the majority flows to state-owned enterprises, which have lower returns on assets than private enterprises.



[1] Private sector includes private enterprises and foreign enterprises.
[2] SOEs includes state holding enterprises.

Source: MGI China debt database; MGI country debt database; BIS; CEIC; McKinsey Global Institute analysis

Opportunity 4: China could collaborate with the world to deliver solutions to global challenges

International cooperation is under strain. The rules of the game underpinning the global economic system and governance are in flux. Yet global challenges remain that can only be addressed through international cooperation such as designing a new multilateral trade system, tackling global climate change, reaching consensus on digital governance (such as data flows and digital sovereignty), and filling the world's estimated annual $350 billion infrastructure investment shortfall.[1] As the second-largest economy in the world, China should be part of these conversations and help shape solutions. China has already indicated its interest in playing a greater role in defining the new rules of the game by establishing institutions, mobilizing capital, and participating in international climate agreements.

[1] *Bridging global infrastructure gaps*, McKinsey Global Institute and McKinsey's Capital Projects and Infrastructure Practice, June 2016.

40%

annual rise in Chinese funding of UN organizations since 2010

China is already playing a larger part in international institutions. Its funding of United Nations organizations has increased by 40 percent per year since 2010, and it is now the third-largest UN donor after the United States and Japan. However, China still accounts for only 9 percent of funding for the WTO and the Industrial Development Organization, 8 percent of funding for the Department of Peacekeeping Operations and UNESCO, and 5 percent of funding for the International Labor Organization and WHO. China is becoming a more significant source of development financing abroad. Historically, the country has participated in development financing through existing multilateral development finance organizations like the Asian Development Bank, IMF, and the World Bank. However, in recent years China has played a more active role in development financing through its establishment of two multilateral development banks: the Asian Infrastructure Investment Bank and the New Development Bank, in which it holds 30 and 20 percent shares, respectively.

China is expanding its network of free trade agreements. It has bilateral free trade agreements with 12 economies and is an active member of the ASEAN-China multilateral trade deal. As of late 2018, China was negotiating an additional 11 bilateral agreements (including four "upgrades" to existing agreements) and three multilateral agreements (with Japan and South Korea, with the Regional Comprehensive Economic Partnership, and with the Gulf Cooperative Council). If these agreements are finalized, China will have free trade partnerships accounting for 21 percent of global GDP and 12 percent of the total value of global trade (Exhibit 46).

China is already contributing to the global agenda, for instance in the area of climate change, where it can make a major contribution to tackling this complex and challenging issue. In 2017, China accounted for almost half of new global renewable energy capacity.[1] Its firms now have global scale in solar panels, with an estimated 48 percent share outside the domestic market. Beyond renewables, the Chinese government's focus on clean coal and emissions reduction has led to the closure and renovation of old coal-fired plants in favor of high-efficiency units; Chinese coal-fired plants are already 24 percent more coal-efficient than the US average.[2] China has been recognized for its significant reduction in carbon emissions.[3] It has already developed several solutions as part of this effort, including adopting cleaner energy production methods, transitioning to renewable energy sources, and increasing demand for new energy vehicles. More engagement could lead to the export of these systems to other countries to reduce global carbon emissions, as well as greater innovation in climate change solutions.

In infrastructure, China's investment in countries included in the Belt and Road Initiative has contributed to narrowing the world's infrastructure gap. Investment has focused in particular on energy and transportation infrastructure (Exhibit 47). China and the world can work together to maximize the impact of China's contribution to the world's infrastructure gap. For example, China can enhance the transparency about the sources of investment, environmental impact, operating models, and expected returns of its BRI projects. The rest of the world will, in turn, need to strengthen project management capabilities and better assess the associated risks and returns of BRI investment.

1 *Made in China 2025 and the future of American industry,* Project for Strong Labor Markets and National Development, US Senate Committee on Small Business & Entrepreneurship, February 2019; and Eri Sugiura and Akane Okutsu, "China's renewable energy surges after state backing," *Nikkei Asian Review,* November 21, 2018.

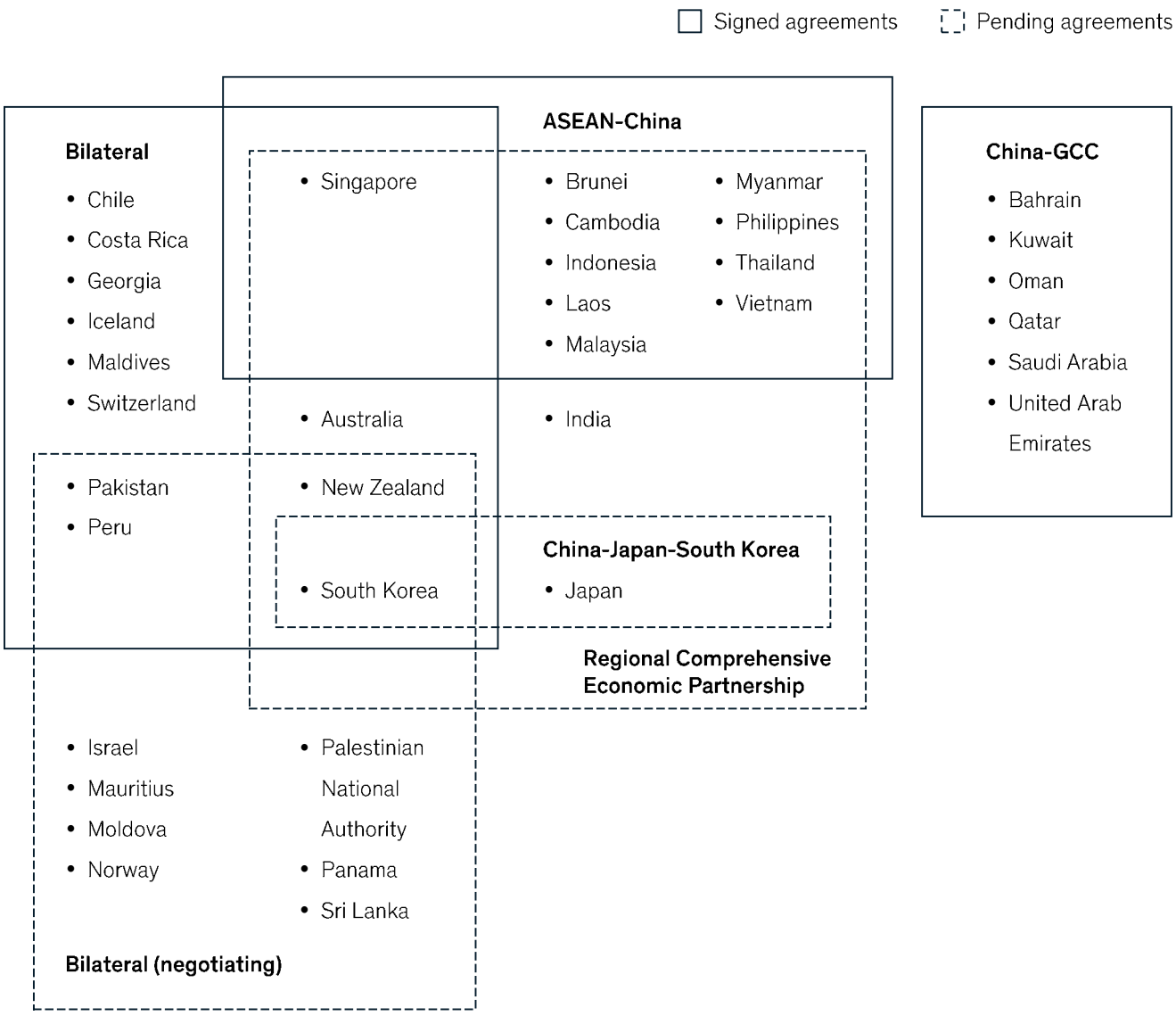
2 Melanie Hart, Luke Bassett, and Blaine Johnson, *Everything you think you know about coal in China is wrong,* Center for American Progress, May 15, 2017.

3 Anita Engels, *Understanding how China is championing climate change mitigation,* Palgrave Communications, article number 101, 2018.

Exhibit 46

Planned free trade agreements between China and the world cover 12 percent of the value of global trade and 21 percent of global GDP.

China has already established free trade agreements with 21 economies and is negotiating with an additional 15 countries[1]



[1] Figures include trade with Hong Kong SAR and Macau SAR; economic and partnership agreements not displayed.

Source: HS; NBS; OECD; McKinsey Global Institute analysis

In digital governance, China and the world can collaborate on facilitating debates on cybersecurity, the digital divide, data flows, privacy protection, and digital sovereignty, and work toward consensus on these global issues. China can share its experience and know-how in building the digital economy and expanding digital infrastructure.

Conversely, if China and the world were to become less engaged, leadership and collaboration on key global challenges could weaken. The stakes are high on climate change, for instance. One study estimates that the long-run (year 2100) economic gains of complying with the 2 degrees Celsius target of the Paris Accord could be as high as $17 trillion per year.[1] The global infrastructure gap, which MGI has estimated at $350 billion per year, could lead to significant deceleration of global productivity growth if left unfilled.[2] A lack of global coordination in digital governance could lead to intensified data localization, which some estimates quantify as a 2 percent negative impact on global GDP.

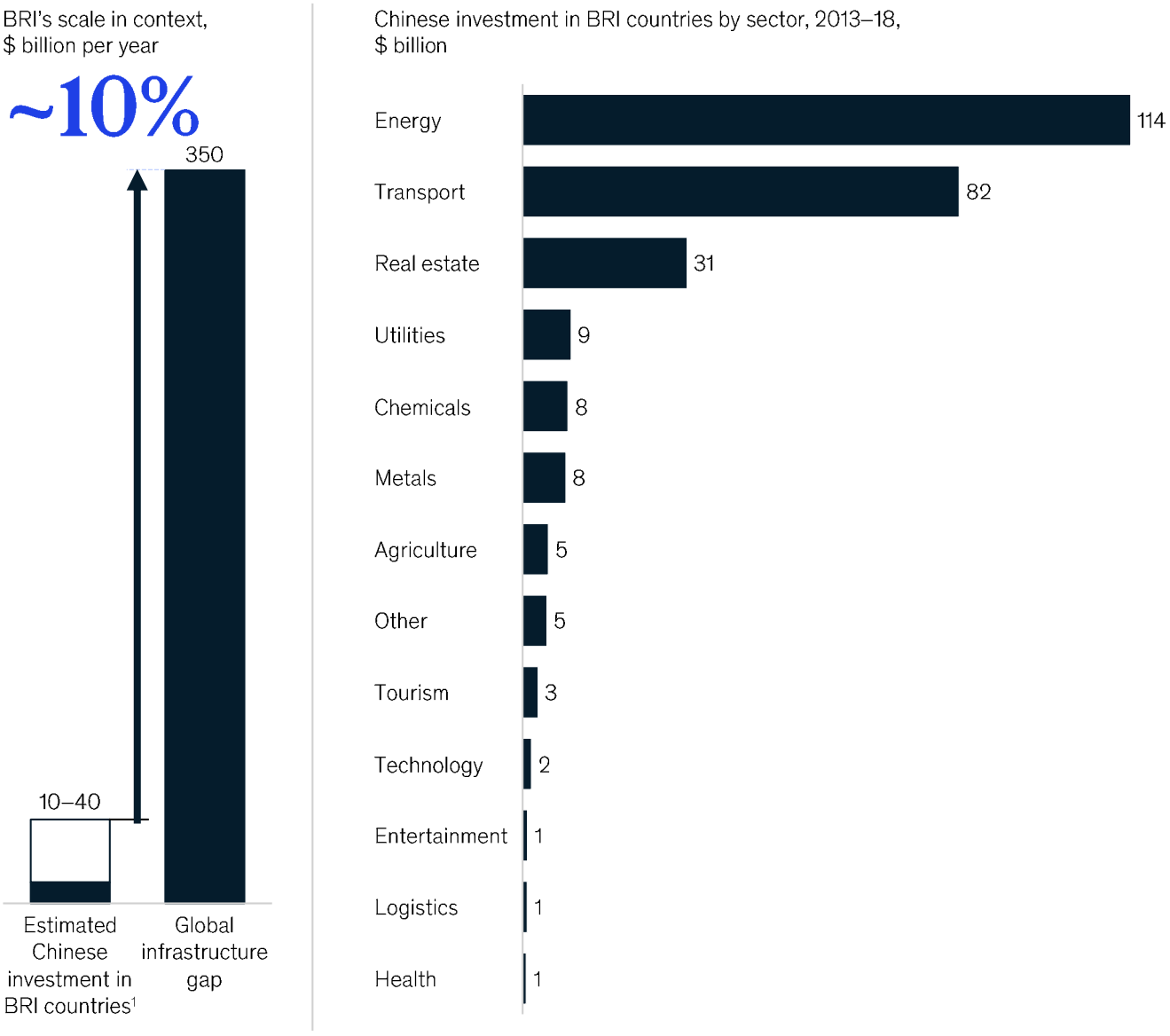
Realizing the more-engagement scenario requires collective commitment from the world, too. All countries would prefer to limit global carbon emissions and thereby reduce negative effects such as pollution, which is deleterious to health, and rising global temperatures. Moreover, collective action is needed given the global scale of the challenge. Nevertheless, acting individually (and in their perceived best interests), countries can still opt to continue emitting because the alternative is unpalatable—for instance, they may regard investing in clean energy as coming at the expense of economic development.[3] If countries were to work together, taking a long-term view and committing themselves and each other to specific goals and milestones in order to deliver a positive impact for all, a greater level of Chinese engagement would, in turn, have more impact.

In the areas of climate change, infrastructure deficit, and digital governance, our simulation shows that $3 trillion to $6 trillion could be at stake. We note that the downside risk from climate change could grow much larger beyond 2040.

1 Tom Kompas, Van Ha Pham, and Tyong Nhu Che, "The effects of climate change on GDP by country and the global economic gains from complying with the Paris Climate Accord," *Earth's Future,* July 13, 2018, Volume 6, Issue 8.
2 *Bridging global infrastructure gaps,* McKinsey Global Institute and McKinsey's Capital Projects and Infrastructure Practice, June 2016.
3 S. M. Gardiner and L. Hartzell-Nichols, "Ethics and global climate change," *Nature Education Knowledge* 3(10), 2012.

Exhibit 47

Investment in Belt and Road Initiative countries can help to fill the global infrastructure gap.



[1] China's Ministry of Commerce estimates investments of $14 billion–$16 billion from 2016–18. Bottom-up estimates from other sources suggest the number may be as high as $40 billion a year.

Source: China Ministry of Commerce; American Enterprise Institute; Bloomberg; McKinsey Global Institute analysis

Opportunity 5: Collaborate on technology and innovation to create globally competitive solutions that increase productivity for all

China's long-term sustainable development will require continuous innovation and moves up the value chain; neither can happen without a strong technological foundation. Cognizant of the importance of accessing technology, China has used joint ventures, favorable FDI policies, and preferential treatment of foreign enterprises to benefit from technology spillovers from these firms and obtain a gateway to global value chains.[1] Reduced technological flows could risk China losing momentum in its bid to become a first-class digital and innovation economy.

40%

of global patents applications came from China in 2016

As we discussed in chapter 3, in some technologies China still has a quality gap to close. For example, it leads the world in the volume of patents it issues but lags behind, on average, in the quality of those patents. China accounted for about 40 percent of global patent applications in 2016, according to the World Intellectual Property Organization. In three key sectors that we studied—automotive, aerospace, and advanced electronics—China owns 85, 49, and 18 percent of worldwide patents, respectively. However, its share of high- and medium-strength patents in these sectors is only 4 to 11 percent, compared with 14 to 27 percent in non-Chinese patents.[2] In order to close quality gaps, openness to the technological inputs and expertise of foreign enterprises would seem vital.

China's international exposure has made a vital contribution to its dynamic development of innovation and a startup ecosystem. About 60 percent of China's unicorns have executives with international experience, and their valuation exceeds that of companies that rely exclusively on local talent by a factor of three according to our bottom-up analysis. China's Thousand Talents program has surpassed its initial aspiration, with more than 7,000 experts attracted to the undertaking, of whom 30 to 40 percent are going to non–Tier 1 cities.[3]

One benefit from greater engagement between the technology industries of China and the rest of the world could be a global IP rights protection system. One report estimated that counterfeit goods, pirated software, and the theft of state secrets were costing the US economy between $225 billion and $600 billion a year globally.[4] However, the bigger prize of engagement could be greater global collaboration on innovative solutions. Chinese firms have already made a very significant contribution to global innovation. Chinese firms accounted for 38 percent of growth in R&D spending between 2010 and 2015, and 80 percent of growth in patent applications. Since opening up in 1978, China has produced seven million postgraduates, and in 2016, it became the world's largest producer of scientific articles (426,000 studies were published, compared with 409,000 in the United States).[5] The OECD projects that China could account for 37 percent of STEM graduates in OECD and G-20 countries by 2030. China also accounts for about one-third of global unicorns, incubating dynamic business models especially related to the digital economy. In emerging technologies, China is making progress toward achieving global milestones. At the start of 2019, China's Chang'e 4 became the first spacecraft in the world to land on the far side of the moon, a new milestone for global space discovery. As China becomes an increasingly important technological innovator, it can contribute know-how to both emerging and developed markets. For instance, it recently signed an agreement to codevelop an Earth observation satellite with the Egyptian government to support the establishment of the Egyptian Space Agency. Even more engagement on this front could help facilitate global innovation, boosting productivity and economic growth.

1 John Van Reenan and Linda Yueh, *Why has China grown so fast? The role of international technology transfers,* Oxford University Department of Economics, working paper, January 2012. Also see *Outperformers: High-growth emerging economies and the companies that propel them,* McKinsey Global Institute, September 2018.

2 The strength of patents is indicated by a score out of 100 published by Innography. We define a patent as high strength if it scores over 70, medium strength with a score of 40 to 70, and low strength with a score below 40.

3 The Thousand Talents program was established in 2008 to recruit international experts in scientific R&D, innovation, and entrepreneurship into China, through special benefits such as high pay, visa privileges, and prestige. See Hepeng Jia, "China's plan to recruit talented researchers," *Nature,* January 17, 2018.

4 *The theft of American intellectual property: Reassessments of the challenge and United States policy, Update to the IP Commission Report,* The National Bureau of Asian Research, 2017.

5 According to data from China's Ministry of Education and World Bank.

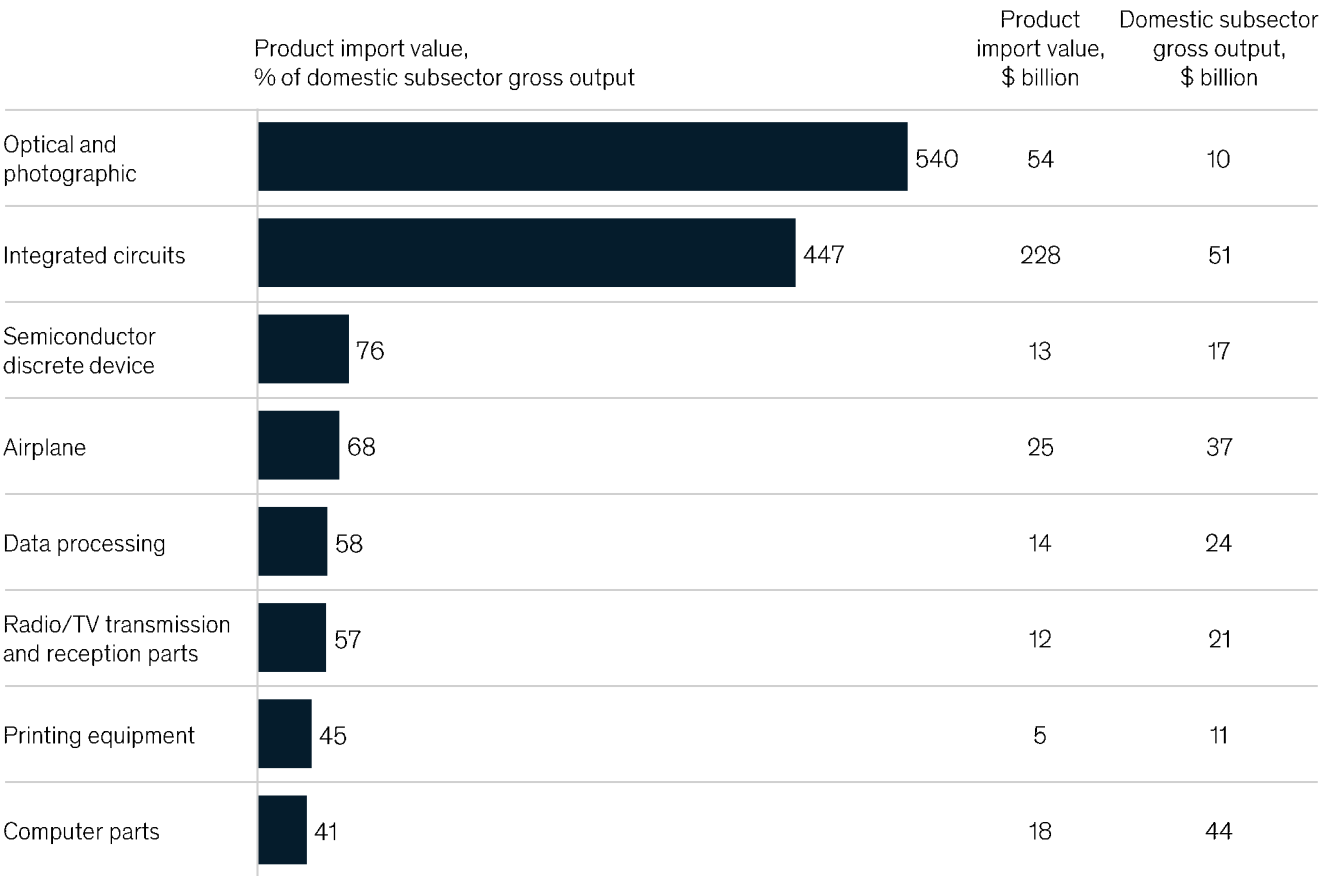
Chinese pharmaceutical companies are innovating to produce solutions for critical diseases. The number of applications of local drugs entering clinical trials increased from just 21 in 2011 to 88 in 2016, representing 33 percent annual growth.[1] These trials have led to significant milestones, such as the first completely homegrown mainstream cancer treatment approved for commercialization in 2018.[2] In the same year, some foreign pharmaceutical companies obtained approval for their drug in China ahead of Western countries for the first time.[3]

In contrast, if trade tensions between China and the United States were to lead to higher tariffs in the long term, more scrutiny of foreign investment, or even technology embargos, this could have a significant impact on Chinese productivity due to a loss of access to foreign technologies. China's dependence on imports remains much more acute than is the case with other large economies in some key products. For instance, its imports of integrated circuits and optical devices are about four to five times domestic production, respectively (Exhibit 48). And the impact would be felt beyond China. In certain high-tech sectors China accounts for more than 20 percent of global trade, and less engagement could mean lost access to Chinese technology exports, potentially leading to higher costs that limit global innovation.

1 Fangning Zhang and Josie Zhou, *What's next for pharma innovation in China,* McKinsey & Company interview, September 2017.
2 *Chi-Med and Lilly's cancer drug Elunate a milestone for China,* PMLive, pmlive.com/pharma_news/chi-med_and_lillys_cancer_drug_elunate_a_milestone_for_china_1263760.
3 Denise Roland and Preetika Rana, "Big Pharma wins drug approval in China ahead of West for first time," *Wall Street Journal,* December 20, 2018.

Exhibit 48

In some high-tech sectors, imports outweigh local production by up to a factor of five.



Source: Comtrade database, UN; China Industry Statistical Yearbook; IHS Markit; McKinsey Global Institute analysis

The stance of the non-Chinese world on technology flows is critical in determining whether there is more or less engagement. Each country can determine its position on national security reviews, the scope of export controls, the definition of "critical" technologies, and how open in general they want to be. Such decisions, in turn, will have a substantial impact on technology and IP flows. Stricter controls would likely mean reduced technology flows with China and as a result less potential to use China as an innovation platform for the world—what has been called an innovation-security conundrum.[1] More engagement with China could offer opportunities to rapidly commercialize technologies especially in emerging areas such as AI by gaining access to China's large user base and vast digital ecosystem, both of which are expanding rapidly. Addressing national concerns will be critical to taking advantage of these opportunities.

Up to $12 trillion of value could be at stake from more or less engagement that could boost or diminish China's technology flows, our simulation shows. Greater engagement could lead to the development of competitive and innovative solutions that raise productivity. However, less engagement could lead to diminished flows of technology; inefficient investment in parallel, separate technology value chains; and decreased access to globally competitive solutions.

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A significant degree of disengagement between China and the world could potentially mean a significant loss of value for each. In contrast, continued reform of the Chinese economy that reinforces its global ties could create large value for both China and the rest of the world. Which of these is most likely to occur is uncertain. In the final chapter of this report, we look at how business executives might react and adapt to more uncertainty in the relationship between China and the world.

[1] Robert D. Williams, *Protecting sensitive technologies without constricting their development,* Brookings, November 30, 2018.

6 Managing through the uncertainty

International relationships may be shifting and tensions may be running somewhat high, bringing more uncertainty than usual to businesses with exposure to China. However, as we have described in this report, plenty of opportunities remain for businesses in China—a nation, investor, supplier, and consumer that is too large to easily factor out of business strategies. In this final chapter, we suggest four areas of consideration to manage the uncertainty of the China-world relationship.

Assess short- and long-term exposure to the China-world relationship

Businesses should evaluate their short- and long-term exposure to the changing relationship between China and the world before they opt for a particular strategy, using different lenses to identify areas where a business is sensitive to risks in the changing dynamics of China's relationship with the world or may benefit from a scenario of greater engagement with China. At a high level, multinational corporations can assess their overall exposure through metrics such as the share of revenue and profits earned in China. A more detailed look at how changes in the China-world relationship could affect business can uncover additional risks and opportunities. It is also important to examine trends that may affect operations in countries and sectors that are more exposed to China. Specific metrics can reveal exposure on each of the eight dimensions discussed in chapter 1 and can lead to key questions for each (Exhibit 49).

— **Firms.** What does the changing competitive landscape in China look like in the company's sector? Who are the rapidly growing Chinese firms that could be competitors? Are there any partners who could help expand the business in China? How could new players in China affect the business? How is growth of Chinese firms likely to affect the business outside China?

— **Trade.** What role does China play in the global value chain? How much is sourced from China? How much is exported to China to serve the Chinese market? What are the cost implications of changes in tariffs on these flows? Where could the company relocate key segments of its supply chains if trade tensions were to continue to rise?

— **Capital.** How much capital is committed to China today? How attractive is China as an investment destination compared with other high-growth economies? What opportunities can the company capture from China's outbound investment in other parts of the world?

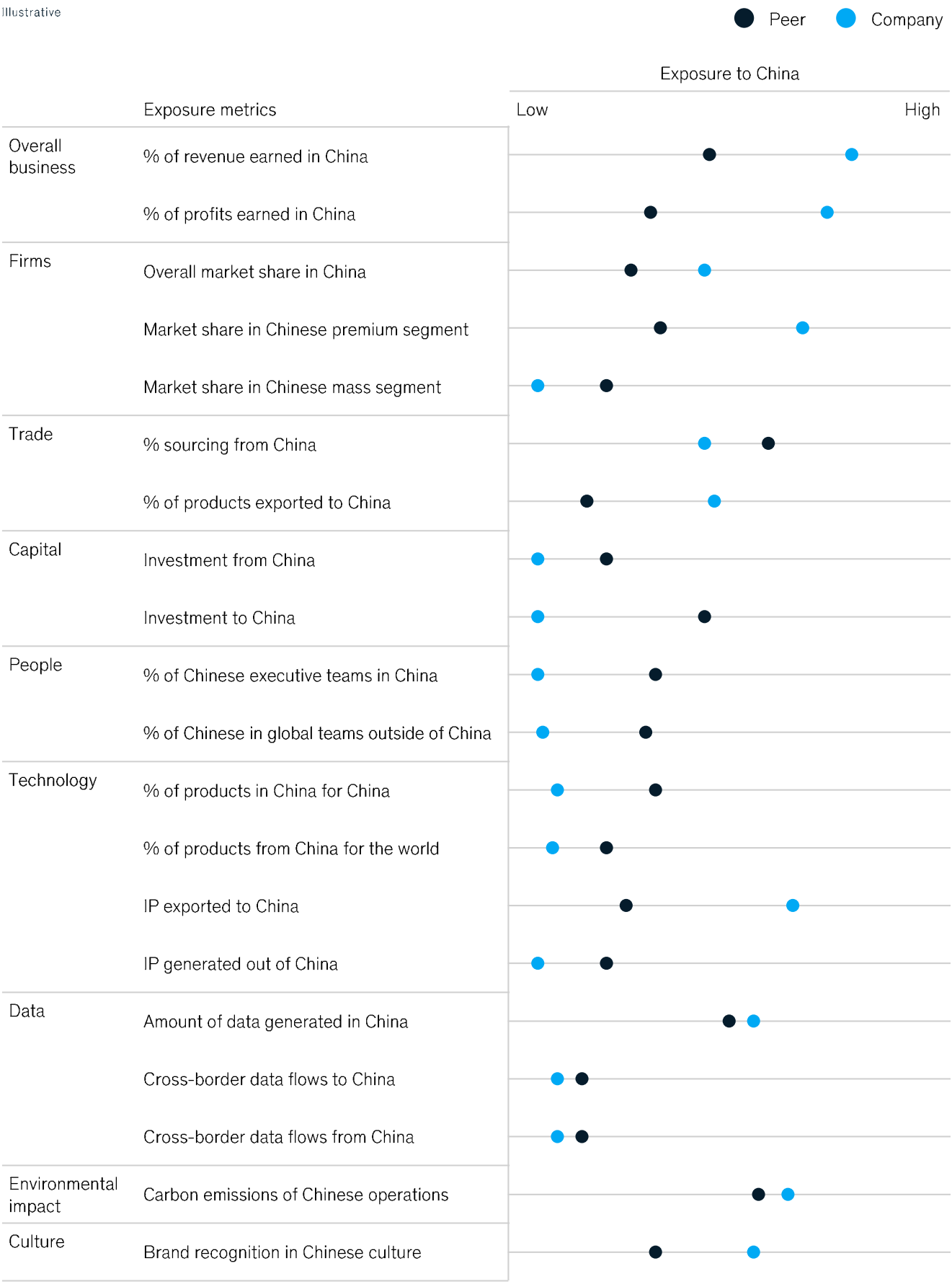
— **People.** Does the business fully leverage the Chinese talent globally? Does the company effectively localize and empower teams in China? What are the opportunities of serving Chinese people outside China? Where are Chinese consumers traveling? How can the company capture outbound Chinese tourist spending?

— **Technology.** Is China a global innovation center (from China to the world) or does it largely serve the local market (in China for China)? Will the company need to develop separate value chains for China or will those established in the rest of the world suffice? How should the company manage technology transfers to local operations while protecting IP?

Exhibit 49

Businesses can assess their exposure to the China-world relationship on eight dimensions.

Illustrative



	Exposure metrics
Overall business	% of revenue earned in China
	% of profits earned in China
Firms	Overall market share in China
	Market share in Chinese premium segment
	Market share in Chinese mass segment
Trade	% sourcing from China
	% of products exported to China
Capital	Investment from China
	Investment to China
People	% of Chinese executive teams in China
	% of Chinese in global teams outside of China
Technology	% of products in China for China
	% of products from China for the world
	IP exported to China
	IP generated out of China
Data	Amount of data generated in China
	Cross-border data flows to China
	Cross-border data flows from China
Environmental impact	Carbon emissions of Chinese operations
Culture	Brand recognition in Chinese culture

Source: McKinsey Global Institute analysis

— **Data.** Can the business monetize data collected locally in China versus other markets? How can the company deal with evolving Chinese requirements on data localization and restrictions on cross-border data flows?

— **Environmental impact.** How are continued efforts by China to curb carbon emissions likely to affect the business's costs? What investment might the business need to make to reduce the costs of long-term emissions?

— **Culture.** How does the company consider China's cultural context in brand building and marketing activities? What are the potential sensitivities? What risk management processes and contingency plans should the company have in place in case of unexpected events such as unintended reactions in social media and reputation damage?

A business's exposure profile across these eight dimensions could reveal risks and opportunities. For example, a company with a high share of revenue and profits earned in China but a low degree of Chinese integration on many dimensions—for instance, minimal R&D activities in China, low capital investment for expanding the business's footprint, and limited representation of Chinese people in its China organization—may have trouble handling increasing competition from players that have dedicated R&D resources in China, sharpening their value proposition for Chinese policy makers. A company that has a strong data-driven business model but with a limited business presence in China can tap into China's digital economy, use the vast pool of data generated, monetize those data, and develop new IP out of China. Equally important are trends in a business's exposure across these dimensions. A company with increasing sourcing exposure to China may experience falling market share in key price bands due to local competition; it can consider diversifying in search of new growth opportunities—and in case of escalated tension.

The metrics and questions highlighted here could be equally relevant for Chinese businesses, many of which are part of global supply chains. It is important for them to consider how much of their business operations are exposed to the global economy. How can they serve the global market through trade? What competitive pressures do multinational corporations introduce to the domestic market, and how can Chinese companies compete in the global market? How can they tap into global capital and foreign talent pools? What foreign IP and technological know-how are they most exposed to? What are the costs of complying with global environmental regulations? How sensitive is the brand to the perception of Chinese culture in global market? Chinese companies can consider their exposure to the global economy by focusing on key areas of economic exposure just as multinational corporations can gauge their exposure to the Chinese market.

Determine investment and value chain posture

Given the scenarios and value at stake for every company, executives should determine their China strategy in terms of investment commitment compared with other countries as well as the role that China should play in the company's global value chains. They should define the implications of the China and the world environment for their strategy based on their assessment of exposure and their scenarios of how the China-world relationship might develop. At one extreme, businesses could double down on investment in China if they believe in the fundamentals of the economy and the long-term growth trajectory that China provides in spite of potential uncertainties. Or businesses might scale down investment and take a more conservative approach, especially in scenarios where there is less engagement between China and the world.

Strategy should be robust to short-term volatility, incorporating it through scenarios and other techniques. Even in the most benign and stable of circumstances in the world economy, there is a compelling argument for thinking in the long term rather than short term. A McKinsey study found that companies that adopted a long-term mind-set earned 47 percent greater revenue and had 58 percent greater market capitalization than their more shortsighted counterparts.[1] Uncertainties in the relationship between China and the world can create priorities that appear to contradict one another. When the operating environment is uncertain, it is even more important to have a long-term view of value creation. In the case of China, the following are worth considering:

— **See past the short-term noise.** At the time of writing, discussion is widespread about the downsides for growth in China from, for instance, continuing trade tensions and rising debt. However, companies would do well to look at the fundamentals of China's economy, which, in many respects, has continued growth momentum. As we noted in chapter 4, the drivers of consumption growth, including rising incomes, intergenerational transfers, and Chinese consumers' desire to trade up, may remain solid. Urbanization, a force for both growth and higher productivity, is likely to continue. The underlying drivers of economic growth in China are likely to persist. Companies that believe in the strong growth momentum of Chinese consumption have invested in the market despite short-term noise. For instance, Tesla has broken ground on its planned $5 billion factory in Shanghai that has an initial production target of 250,000 EVs a year. The factory is Tesla's first outside the United States, and its aim is to insulate the company from import tariffs.[2] BMW has announced a €3.6 billion investment to increase its stake in its joint venture with Chinese automotive company Brilliance Automotive from 50 percent to 75 percent.[3] Starbucks plans to double its number of stores in China to 6,000 in 230 cities by 2023, which it says means opening a new store every 15 hours.[4] California-based international biotechnology company Amgen has set up a joint venture with China's Simcere Pharmaceutical Group to codevelop and commercialize four biosimilar drugs. Insurer AXA is paying over $600 million to buy out its China joint venture.[5]

— **Define long-term "aspirations" in and from China.** Businesses need to be clear on their long-term aspirations in China. Do they want China to be the top contributor to their growth, or should China be a niche play? Depending on those choices, the business model and investment required are very different.[6] One approach is to prioritize China as a center for global growth. This could include bold actions such as moving headquarters to China or setting up a strategy to become a "Chinese company." By contrast, Australian bank ANZ has a niche strategy in China, focused on sectors where the bank believes it has strength, namely agriculture, resources, and healthcare, and on companies in China that have links with and a focus on Australia and New Zealand.[7] China Merchants Group has become one of China's most successful companies (with $40 billion in revenue and a spot on the Global Fortune 500) by defining its long-term aspirations in China and investing accordingly. In 1979, it was one of the first Chinese companies to take advantage of China's opening up by investing $60 million Hong Kong dollars in the Shekou economic development zone, and more recently it has ventured into venture capital investment through a $6 billion stake in the Chinese New Era Technology Fund.[8] Focusing on key metrics can help executives shift toward more long-term thinking, according to the McKinsey-CPPIB "focusing capital on the long term" survey of 2013, which polled 474 respondents on which aspects are the most important for long-term decision making.

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1 Dominic Barton, James Manyika, and Sarah Keohane, "Finally, evidence that managing for the long term pays off," *Harvard Business Review,* February 9, 2017. Also see Dominic Barton, "Capitalism for the long term," *Harvard Business Review,* March 2011.

2 "Elon Musk in China to break ground for first Tesla factory outside U.S.," Bloomberg News, January 7, 2019.

3 "BMW to take control of China venture Brilliance Automotive," BBC News, October 11, 2018.

4 Wang Zhuqiong, "Starbucks aims to increase stores, revenue in China over 5 years," *China Daily,* May 16, 2018.

5 Enoch Yiu, "AXA to pay US$662 million for full control of China joint venture, as Beijing speeds up opening before Xi-Trump meeting," *South China Morning Post,* November 27, 2018.

6 Jeff Galvin, Jimmy Hexter, and Martin Hirt, "Building a second home in China," *McKinsey Quarterly,* June 2010.

7 Xiaoguang Huang, *China strategy: Focus on the niches,* bluenotes, December 18, 2017.

8 *China Merchants Group,* Economic and Commercial Counsellor's Office of the Embassy of the People Republic of China in Latvia. February 2, 2016; and Zhang Hongpei, "Shekhou, a symbol of reform and opening up," *Global Times,* February 25, 2018.

1,500

R&D centers operated by foreign multinational corporations in China vs

200

in 2000

— The survey revealed that the top dimension was customer satisfaction—45 percent of respondents cited it as their top priority in developing economies, and 41 percent globally. In contrast, only 12 percent in the case of developing economies and 13 percent globally cited stock market performance.

Chinese companies can similarly benefit from focusing on long-term strategy and aspirations. Although China is the world's largest and fastest-growing market in some categories, as GDP growth slows (as it is expected to) and as competition increases, the race to expand into international markets will grow more heated. An assessment of long-term growth fundamentals can help concentrate their investment and resources in areas that are likely to generate the most value. Serving non-Chinese markets is likely to require new competencies, and Chinese companies will have to consider investing in value creation to better position themselves to compete with foreign companies.

— **Prioritize investment in line with strategy.** When times are uncertain and growth is under pressure, many companies seek to limit cash outflows, creating a disconnect with strategy. However, it is precisely at such times that more, rather than less, investment may be needed to ensure value creation in the long run. McKinsey has found that firms that increased R&D expenditure during the financial crisis despite experiencing larger fluctuations in market capitalization have performed better as a result.[1]

Investing in innovation at a time of increased global uncertainty about technology flows is another potential case in point. Today, multinational corporations operate more than 1,500 R&D centers in China, compared with only 200 in 2000.[2] Switzerland's Roche, for instance, has invested $126 million in a Shanghai-based innovation center to develop new antibiotics and hepatitis B treatments. Mondelēz International, the US food and beverage multinational corporation, has established a research center in Suzhou. Chinese companies are also shifting toward more innovation and global collaboration despite technological uncertainty. After investing heavily in R&D, Wanhua was able to develop a proprietary methylene diphenyl diisocyanate process, moving from its commoditized core products to higher-value-added activities and capturing demand growth in a specialized subsegment of the industry where only four other players globally shared leadership. Now it has invested in a major greenfield North American facility, acquired the largest Hungarian chemicals group, and become the first China-based company to be named company of the year by ICIS.[3]

1 Dominic Barton, James Manyika, and Sarah Keohane, "Finally, evidence that managing for the long term pays off," *Harvard Business Review,* February 9, 2017.
2 Nick Marro, "Foreign company R&D: In China, for China," *China Business Review,* June 1, 2015; and Dominique Jolly, Bruce McKern, and George Yip, *The next innovation opportunity in China, Strategy + Business,* July 27, 2015.
3 *Wanhua Cracker Project part of 'eco-chain' integration,* The Urethane Blog, December 17, 2018.

Develop operational excellence to manage risks and uncertainty

Operating a business when the environment is particularly volatile requires specific organizational capabilities. Evidence from a McKinsey survey suggests that uncertainty was already on the rise among businesses in 2015. In the survey, 84 percent of respondents indicated that "geopolitical instability" would have an important or very important effect on global business. However, only 13 percent of respondents indicated that their organization had taken active steps to address these risks.[1] A helpful framing of geostrategic risk could consider an organization's ability to anticipate risk and the likely magnitude of the risk on business. Mitigation strategies could help reduce the risks a business is sensitive to. Useful steps that businesses exposed to China-world relationship risk might consider include:

— **Strengthen regulatory stakeholder management.** As regulators have taken more interest in cross-border transactions—for instance, M&A deals, particularly those that involve the transfer of technology—businesses have needed to be acutely aware of changing stances and the possibility of increased bureaucracy. Governments and policy makers, while strongly motivated by creating economic value, have other considerations such as national security. Understanding and engaging in dialogue with regulatory stakeholders will be important to understand and address both economic and noneconomic concerns.

  Chinese companies in particular need to strengthen their understanding and management of global stakeholders, and, for companies that already operate abroad, to understand the local context to minimize the risk of controversies and tensions. Some Chinese companies in the energy and resources sector have experienced massive cost overruns and cancellation of projects, have acquired overseas resources partly due to a lack of alignment with local officials, and have displayed poor understanding of local regulatory and cultural regulations compliance, for example.[2] A real estate company that acquired a property in Europe couldn't carry out restoration work according to its original plan due to different opinions from local governments and residents.[3]

  In China, the ability to manage different levels of bureaucracy and operational barriers will continue to be important. Businesses are subject to central, provincial, and local governments, and a clear understanding of regulations, barriers, and opportunities on each of these levels is crucial for success. Some foreign firms have had success in leveraging the opportunities that engaging with these stakeholders can provide. By 2008, General Motors had established operations in China through its joint venture with state-owned Shanghai Automotive Industry Corporation. When the financial crisis pushed it to the brink of bankruptcy and US federal aid couldn't help it sustain its overseas operations, GM leveraged its relationship with the Chinese government to obtain a $491 million liquidity package.[4] The relationship between the two became closer after the bailout, with a growing share of GM's vehicles produced through its Chinese joint venture and exported to developed markets such as the United States. The support of government and creditors, and access to capital were critical in weathering the crisis. Dow, the US chemical multinational corporation, partnered with China's Ministry of Environmental Protection to enhance its capabilities in China for managing sustainability challenges, and to design new programs and policies.

1 *Geostrategic risks on the rise,* McKinsey & Company, May 2016.
2 Wayne Arnold, "China's global mining play is failing to pan out," *Wall Street Journal,* September 15, 2014.
3 "Chinese firms should be wary of overseas obstacles," *Global Times,* December 7, 2017.
4 Edward Niedermeyer, *The secret history of GM's Chinese bailout,* Quartz, January 24, 2016.

— **Pay attention to local context:** Changes in the business environment can expose companies' operations to more risks, and paying attention to details and local context will be increasingly important. Multinational corporations often play the role of "corporate diplomat" for their home countries, but they can face risks if their government comes into conflict with another. The number of Chinese tourists visiting South Korea dropped by more than 50 percent during a period when relations between the countries were strained in 2017.[1] A Japanese automaker's sales in 2012 dropped by 50 percent amid tensions between the Chinese and Japanese governments.[2] Similar situations have affected Chinese businesses abroad, too. When China moved an offshore oil rig to an exclusive economic zone in Vietnam, political disquiet motivated Chinese sourcing companies to close their Vietnamese operations.[3]

Multinational corporations also need to prepare themselves for potential market-facing issues by ensuring that they develop their knowledge and understanding of public sentiment and behavior in the geographies in which they operate.[4] One European luxury brand ran a marketing campaign in China that was interpreted as culturally insensitive, leading to a backlash by Chinese consumers. A global hotel chain temporarily shut down access to its website in China after an operational error that listed certain geographies as stand-alone countries. A European apparel brand and US and Australian airline companies have faced similar situations. Businesses need to strengthen risk management practices to avoid unintended consequences and must put in place processes to minimize damage and regain the trust of consumers in markets in China and beyond.

33%

of respondents said uncertainty about trade policy was their top concern (McKinsey 2018 survey)

— **Make operational footprints agile.** Companies that operate across borders are facing more than usual levels of uncertainty—the United Kingdom's potential departure from the EU and ongoing trade disputes between China and the United States are two current examples. In the September 2018 McKinsey Global Executive Survey, 33 percent of respondents said that uncertainty over trade policy was their top concern, and 25 percent said recent tariff increases were their biggest worry.[5] Companies need to be prepared to shift their footprint in response to adverse or complex developments, and many have done so. Global automotive companies are adjusting production and export plans across their operations to minimize the impact from tariff adjustments. Mitsubishi has moved production of electrical discharge and laser processing machines from Dalian to Nagoya to avoid US import tariffs.

Some companies are considering operating in more "politically neutral" countries. In view of current trade tensions involving China, Southeast Asia may benefit from this trend.[6] In a November 2018 UBS survey of 200 manufacturing companies, 37 percent of firms indicated that they had moved some production out of China in the previous 12 months, and an additional 33 percent said they planned to move out in the next six to 12 months.[7] In the American Chamber of Commerce's 2018 Business Climate survey, 49 percent of American firms that had plans to move production out of China were exploring options in developing Asia.[8] Chinese businesses may also benefit from forming strategic partnerships with players in relatively neutral countries, thereby reducing the risk of global disengagement. Chinese manufacturers have already been exploring opportunities in Southeast Asia in a bid to lower costs, as the region could be a good location for manufacturing categories that are subject to potential tariff changes, such as furniture, textiles, and electronics categories that are susceptible to trade disputes.[9]

1 *Chinese tour agencies resume operations in S. Korea,* Yonhap News Agency, December 19, 2017.
2 Lisa Tam and Soojin Kim, "Nationalism and international disputes in China," *Journal of Asian Pacific Communication,* January 2017, Volume 27, Issue 2.
3 Condoleezza Rice and Amy Zegart, "Managing 21st-century political risk," *Harvard Business Review,* May-June 2018.
4 Lisa Tam and Soojin Kim, "Nationalism and international disputes in China," *Journal of Asian Pacific Communication,* January 2017, Volume 27, Issue 2.
5 *Globalization in transition: The future of trade and value chains,* McKinsey Global Institute, January 2019.
6 George Yeo, "China's trade war pain can be ASEAN's gain: How Southeast Asia is reaping a windfall of shifting trade and investment," *South China Morning Post,* October 16, 2018.
7 Also see *Companies have started shifting their supply chains,* CNBC interview with Kelvin Tay, UBS Global Wealth Management, November 7, 2018. https://www.cnbc.com/video/2018/11/07/companies-have-started-shifting-their-supply-chains-ubs.html
8 *2018 China Business Climate Survey Report,* The American Chamber of Commerce in the People's Republic of China, January 2018.
9 Lien Hoang, "Southeast Asia eyes windfalls from U.S.-China trade war," Bloomberg Law, October 15, 2018.

Adopt and maintain a "survivor's" mind-set

Chinese companies are no strangers to crisis—in fact, the Chinese term for "crisis" combines "danger" and "opportunity." For their part, multinational corporations have endured many shocks over recent decades, including the Asian financial crisis in the late 1990s, the bursting of dot-com bubbles in early 2000s, and the Great Recession of 2008. However, the current environment combines an unprecedented focus on China by the rest of the world and a transition within the Chinese economy itself. Businesses with exposure to these risks could look to the lessons of companies that have survived previous financial crises and recessions. Among the key considerations for companies are:

— **Improve balance sheets and maintain robust access to capital.** In uncertain times, one way to sustain the generation of economic value added is to ensure that the business has a strong balance sheet and can maintain access to capital on good terms. Companies should consider whether they can decrease liabilities by, for instance, selling off unproductive assets. As an illustration, during the Asian financial crisis in the late 1990s, the debt-to-equity ratio of South Korean manufacturing companies increased to about 400 percent. Many large corporations—including Daewoo, Hanbo, and Kia, which were once considered too big to fail—went bankrupt.[1] Companies that survived the crisis were those that took measures to reduce debt and improve their balance sheets.[2] Hyundai merged with Kia and forged a solid domestic position with over 70 percent market share; it is now the seventh-largest global automotive player.[3] The maintenance of a strong balance sheet by Berkshire Hathaway, the US investment vehicle, meant that the company was able to make strategic investment in Goldman Sachs and Bank of America equities even during the 2008 financial crisis.

— **Look out for opportunities to acquire and restructure.** A challenging environment can provide opportunities to acquire businesses at preferential rates. Opportunistic buyers have taken advantage of past economic crises. In 2009, the year after the global recession, Bank of America's $50 billion acquisition of Merrill Lynch led to the creation of the largest bank in the United States.[4] General Motors' acquisition of Daewoo Motors in 2001 gave GM access to compact car segments in which Daewoo had strengths.[5] Tata acquired Jaguar Land Rover from Ford Group in 2008, and Jaguar Land Rover's revenue soared from about $5 billion in 2008 to $24 billion in 2016.

  A challenging economic environment can also create the motivation and sense of urgency needed to make bold strategic choices and restructure businesses to strengthen long-term prospects. Survivors used the Asian financial crisis as a catalyst to revamp business models and improve operational efficiency. Samsung, for instance, launched a series of restructuring programs, and by 2005 had become one of South Korea's most profitable companies, competing head to head with Japanese and US players.[6] Staples closed down some underperforming facilities but increased its workforce by 10 percent during the 2008 recession, mainly to support the high-end product categories and services it introduced. At the same time, the company contained its operating costs.[7] Yum! Brands, the US fast-food company, has spun off its volatile Chinese business from its the global operation to build a leaner business model globally.[8] Leveraging opportunities that arose during a period of economic slowdown, some Chinese developers have launched funds to buy up smaller developers and distressed property debts, accelerating consolidation of the sector.[9]

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1 Kim Kihwan, *The 1997–98 Korean financial crisis: Causes, policy response, and lessons,* Crisis Prevention in Emerging Market Economies, Singapore, July 10–11, 2006.
2 Martin Fackler, "Lessons learned, South Korea makes quick economic recovery," *New York Times,* January 6, 2011.
3 Russell D. Lansbury, Byoung-Hoon Lee, and Seoghun Woo, *Technology, human resources, and international competitiveness in the Korean auto industry,* International Conference on Science, Technology and Innovation: Emerging International Policy Issues, Cambridge, MA, September 23–24, 2002.
4 "Bank of America completes Merrill Lynch purchase," Reuters, January 1, 2009.
5 Choe Sang-hun, "Daewoo, GM finds gold in overall gloom," *New York Times,* May 23, 2006.
6 "As good as it gets? Can a leading consumer-electronics giant keep getting stronger?" *Economist,* January 13, 2005.
7 Ranjay Gulati, Nitin Nohria, and Franz Wohlgezogen, "Roaring out of recession," *Harvard Business Review,* March 2010.
8 Julie Jargon, "Yum looks to be leaner after China spinoff," *Wall Street Journal,* October 11, 2016.
9 Don Weinland, "China developers snap up distressed real estate debt," *Financial Times,* February 18, 2019.

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On many dimensions, China has become a global power. It is the world's second-largest economy and its leading trading nation. However, as the Chinese growth model has evolved from a reliance on exports to an economy largely driven by domestic consumption, the dynamics of its relationship with the rest of the world are changing. While China's economy is becoming relatively less exposed to those of the rest of the world, the rest of the world is increasingly exposed to China. Protectionism is on the rise in many countries. It is possible that instead of deeper engagement between China and the world, the relationship may see some retrenchment. Our analysis finds that less engagement risks significant value for all parties, whereas deeper engagement would have large benefits. Businesses are more or less accustomed to navigating a route through economic pressures, but the stakes have never been higher for the relationship between China and the world. All companies will need to be proactive in their strategies for uncertain times in order to thrive.

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Technical appendix

This technical appendix provides more detail on the sources and methodologies employed in this report. We address the following points:

1. Sources

2. MGI China-World Exposure Index

3. Country-level exposure

4. Sector-level exposure

5. Share of Chinese suppliers in technology value chains

6. Value at stake

1. Sources

We have quantified elements of our research using data from a wide range of sources, including:

- **GDP.** On both a nominal and purchasing-power-parity basis, we used World Bank data.
- **Trade.** For imports and exports in primary and manufacturing sectors, we used IHS Markit data. For imports and exports in services sectors, we used the World Input-Output Database. For bilateral imports and exports to and from China, we used data from China's National Bureau of Statistics, and for bilateral imports and exports to and from the United States, we used the US Census. For estimates of technology imports and exports defined as charges of IP and technical services, we used balance of payments data from the IMF. For the estimated value of technology imported by China, we used the China Statistical Yearbook on Science and Technology.
- **FDI.** For estimates of total inbound and outbound FDI flows for a given country, we used data from UNCTAD, and for estimates of bilateral inbound and outbound FDI flows to and from China, we used data from the National Bureau of Statistics.
- **R&D expenditure.** For estimates of gross expenditure on R&D by country, we used OECD data.
- **Other metrics.** For estimates of total gross output, consumption, and capital expenditure by country, we used IHS Markit data.

2. MGI China-World Exposure Index

To calculate China's relative exposure to the rest of the world, and the rest of the world's relative exposure to China, we looked at three dimensions of economic flows—trade, capital, and technology—and compiled a China-World Exposure Index. On trade, we considered exposure to a country's supply (country's exports divided by rest-of-world consumption) and demand (country's imports divided by rest-of-world production). On capital, we considered exposure to a country's capital (country's outbound FDI divided by rest-of-world inbound FDI) and investment opportunities (country's inbound FDI divided by rest-of-world outbound FDI). On technology, we considered exposure to a country's technology exports (country's exports of IP and technology services and equipment divided by rest-of-world R&D spending).

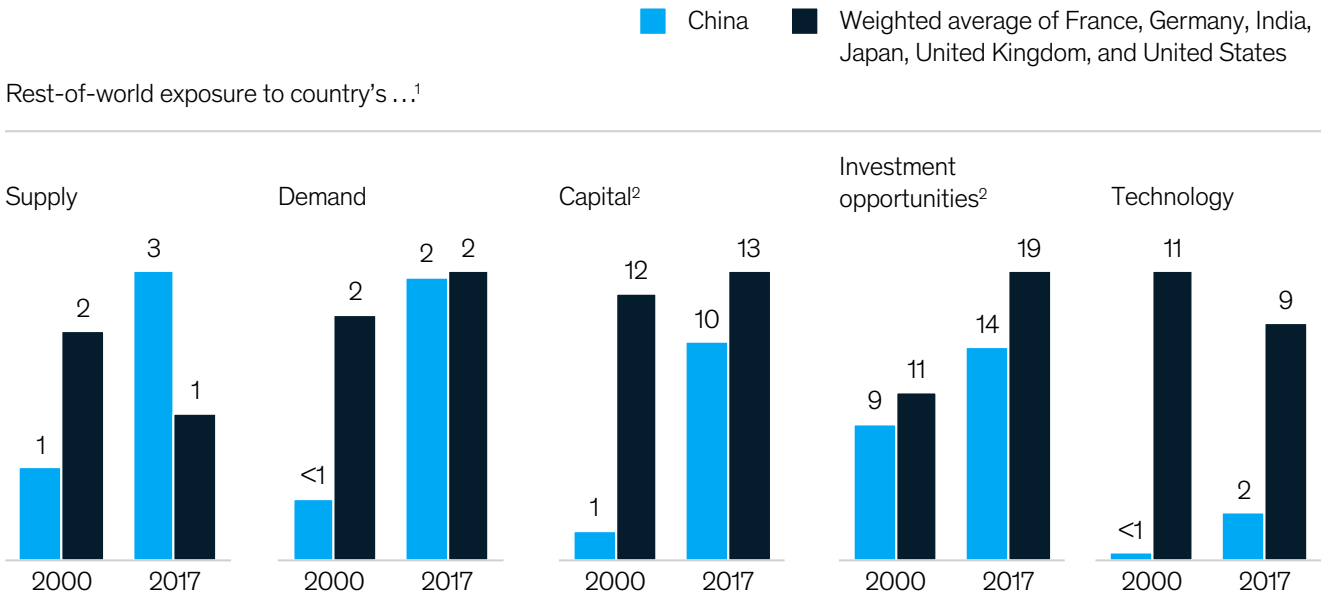
We first measured the exposure between China and the world over the past two decades. We then calculated the exposure of other large economies (namely France, Germany, India, Japan, the United Kingdom, and the United States) to the world for comparison. We set a value of 1.0 as an average exposure index between the world and the seven large economies. A value greater than 1.0 suggests the world is more exposed to China than to the seven large economies, on average, whereas a value less than 1.0 suggests the world is less exposed to China than to the seven large economies. The index measures the relative importance of cross-border economic flows to an economy as inputs rather than outputs. We acknowledge that the absolute sizes of economic flows to and from China (exports and imports, inbound and outbound FDI, and technology flows) have increased during this period (Exhibit A1).

Finally, to aggregate the metrics into a final index, we used weights of 35 percent for each of the trade-related metrics (exposure to supply and demand), and 10 percent for each of the remaining metrics (exposure to capital, investment opportunities, and technology).

Exhibit A1

Relative to other large economies, the world's exposure to China is growing.

%



[1] The overall index is calculated by dividing exposure to China by exposure to benchmark economies, applying a 35 percent weight to exposure to supply and demand, and applying a 10 percent weight to other metrics. Rest-of-world exposure to country's supply is defined as country's exports divided by rest-of-world consumption. Rest-of-world exposure to country's demand is defined as imports divided by rest-of-world production. Rest-of-world exposure to country's technology is defined as technology exports divided by rest-of-world R&D expenditure. Rest-of-world exposure to capital is defined as outbound FDI divided by rest-of-world inbound FDI. Rest-of-world exposure to country's investment opportunities is defined as inbound FDI divided by rest-of-world outbound FDI.

[2] Rolling three-year average; 2000 data are not available, and therefore we assume 2007 levels.

Note: Not to scale.

Source: Comtrade database, UN; China Industry Statistical Yearbook; IHS Markit; McKinsey Global Institute analysis

3. Country-level exposure

To assess exposure to China or individual countries, we assembled bilateral trade and FDI flow data for 73 countries. We looked in particular at three metrics: exports to China as a share of domestic production, imports from China as a share of domestic consumption, and inbound FDI from China as a share of domestic investment. To illustrate the changes to exposure over time, we look at two periods ten years apart (2003–07 and 2013–17). We selected a five-year time frame for each of these periods to minimize seasonality in the analysis. Finally, we defined country archetypes based on the patterns of exposure of each economy. We defined economies with "regional proximity" exposure as those located in Asia; they have relatively high levels of exposure to Chinese supply and demand, accounting for at least 6 percent of Chinese consumption or production, respectively. We defined "resource-related" economies as those with particularly high levels of exposure to Chinese demand (exports to China amounting to at least 8 percent of gross output). We defined economies with "capital" exposure as those with relatively high levels of exposure to outbound FDI, amounting to more than 3 percent of domestic investment.

4. Sector-level exposure

To assess the exposure of different sectors to China, we first looked at trade intensity, defined as gross exports as a share of total gross output for each sector. We then examined China's relative importance in global trade by assessing its share of global exports and imports. As in the country exposure analysis, we used two five-year periods to illustrate changes to exposure over time—from 2003 to 2007, and from 2013 to 2017. Finally, we defined sector archetypes based on patterns of exposure to China. We defined sectors with a "high level of integration" as those with high trade intensities amounting to at least 30 percent of global gross output, for which China accounts for a large share of both global exports (at least 17 percent) and imports (at least 9 percent). We defined sectors with "high exposure to Chinese exports" as those with relatively high trade intensities (amounting to at least 10 percent of global gross output) for which China accounts for a large share of global exports (at least 13 percent). We defined sectors with "high exposure to Chinese imports" as those with relatively high trade intensities (amounting to at least 10 percent of global gross output) for which China accounts for a large share of global imports (at least 12 percent). We defined sectors that have "global chains with little trade exposure to China" as those with high trade intensities (amounting to at least 28 percent of global gross output) for which China accounts for less than 10 percent of global exports or imports. Finally, we defined sectors that have "local production for local consumption" as those with relatively low levels of trade intensity (less than 15 percent of global gross output).

5. Share of Chinese suppliers in technology value chains

We studied 12 technology value chains (solar panels, high-speed rail, digital payments, wind turbines, EVs, cargo ships, agricultural machinery, smartphones, cloud services, robotics, semiconductors, and aircraft), and analyzed the share of Chinese suppliers in "final use" technology markets domestically and in the rest of the world. To analyze the share of local suppliers in domestic value chains, we first identified representative products in each of these markets. We then broke the products down into their first-tier components, usually in the form of a bill of materials. For each of these components, we analyzed the share of Chinese suppliers in the domestic market. Finally, we aggregated the share of Chinese suppliers across the entire value chain by taking a weighted average for each of the first-tier components. We recognize that there are limitations to an analysis that exclusively looks at first-tier components, and that results may vary with a more in-depth analysis at the component level.

6. Value at stake

We simulated the total value that could potentially be lost or gained from more and less engagement between China and the world. We note that the simulation is based on certain conditions and assumptions, and the results should not be taken as forecasts. The simulation that we have conducted does, however, point to significant value being associated with engagement between China and the world. Our modeling had three steps:

Step 1. Define how the degree of less or more engagement will affect economic drivers and what the transmission mechanism will be

Trade flows could affect consumption, prices, and employment around the world. Service-sector liberalization could affect total factor productivity of services sectors due to more competition and best-practice transfers, with indirect benefits that are shared with manufacturing sectors due to a more efficient economy. Financial-sector modernization could enhance capital productivity throughout the economy as it improves resource allocation. Greater provision of global public goods could lead to cost avoidance from carbon abatement and solutions to climate change and higher total factor productivity (TFP) through increased data flows and sufficient infrastructure investment to meet current needs. Collaboration on technology could improve total factor productivity as it facilitates knowledge flows and adoption of competitive solutions.

Step 2. Collect and review external research that can serve as reference information to gauge the economic impact of engagement

We homed in on five areas where China could be more (and, conversely, less) engaged, and found more than 20 papers that provided relevant evidence for their global economic impact. They include:

Trade. The IMF estimates that a US-China trade war would have long-term negative impacts of 0.6 percent and 0.4 percent on Chinese and global GDP, respectively.[1] Similarly, the OECD estimated in November 2018 that tariffs already imposed at that stage by the United States and China could slow output in the two economies by 2020–21 by 0.2 to 0.3 percent, reduce world trade volumes by around 0.4 percent, and cut combined import volumes for the two economies by about 0.75 percent.[2] A report by the IMF, the World Bank, and the WTO found that a one-percentage-point decrease in tariffs could lead to a 2 percent increase in sector productivity.[3] One study estimates that increased Chinese imports in the United States led to a 27 percent price drop in nonoil consumer categories from 1994 to 2017.[4] For certain commodities of which China is a large supplier, such as rare earth metals, observers have noted that prices can increase by seven to eight times in the course of a few months due to Chinese export controls.[5] Others forecast a 10 to 50 percent increase in rare earth prices in the near future.[6] Conversely, lost access to the Chinese market could induce negative short-term price shocks in commodities. One study found that GDP growth in China was the largest determinant of iron ore prices from 2003 to 2012.[7]

1 *World Economic Outlook: Challenges to steady growth,* International Monetary Fund, October 2018.
2 *OECD Economic Outlook,* Volume 2018, Issue 2, Organisation for Economic Co-operation and Development, 2018.
3 *Making trade an engine of growth for all: The case for trade and for policies to facilitate adjustment,* International Monetary Fund, World Bank, and World Trade Organization, April 10, 2017.
4 Lawrence J. Lau and Junjie Tang, *The impact of U.S. imports from China on U.S. consumer prices and expenditures,* Lau Chor Tak Institute of Global Economics and Finance, Chinese University of Hong Kong, working paper number 66, May 2018, igef.cuhk.edu.hk.
5 Robert Castellano, *A new China rare earth embargo would damage several U.S. companies' technology competitiveness,* Seeking Alpha, June 28, 2018.
6 Barbara Lewis and Ernest Sheyder, "China cutting rare earth output, unnerving global manufacturers," Reuters, October 24, 2018.
7 Linda Wårell, "An analysis of iron ore prices during the latest commodity boom," *Mineral Economics,* 2018, Volume 31, Issue 1–2.

Services. A collaborative study by the World Bank, the United States Department of Agriculture, and the International Food Policy Research Institute found that a 50 percent reduction in service trade restrictions could lead to total factor productivity growth in China of up to 3.55 percent in certain sectors.[1] Similarly, one estimate suggests that liberalization of services sectors could boost total factor productivity in manufacturing firms by 9.2 percentage points.[2] Another study found that the liberalization of service trade could increase welfare and household income by 5.3 percent.[3] Another analysis found that countries with fully liberalized telecom and financial sectors (achieved through the introduction of competition, opening up to FDI, and putting in place an independent regulator) experienced 1.5-percentage-point faster growth in GNP than in countries without full liberalization.[4]

Financial markets. The IMF estimates that effective resolution of China's "zombie companies" could lead to a 0.7 to 1.2 percent increase in productivity growth per year.[5] One study estimated that if China were to follow a more modernized approach to capital allocation, its capital productivity could increase by 30 to 50 percent.[6] Another analysis estimated that capital misallocation led to a combined 20 percent loss in revenues for Chinese firms.[7] Other research draws similarities between China's credit booms and those experienced by other economies, and forecasts the likelihood of an eventual bust.[8]

Governance and global challenges. On climate change, a London School of Economics study estimates that curbed emissions of carbon and other harmful gases could lead to $1 trillion avoidance of costs per year.[9] Similarly, a meta-analysis of existing literature compiled by the United Nations Development Programme found that climate change solutions could lead to an increase in global GDP of up to 5 percent.[10] The OECD estimates that a decisive transition toward solving climate change could lead to a positive impact on GDP of 2.8 percent by 2050 (4.7 percent including damage avoided).[11] Conversely, some researchers have estimated the costs of failing to manage global climate change at about $17 trillion.[12] On digital governance, a World Economic Forum report estimated that data localization could have a 1.3 percent negative impact on GDP, while data globalization could have a 0.4 percent positive impact.[13] Similarly, one analysis estimated that data localization could decrease GDP by 1 to 2 percent due to limited cross-border flows.[14] For firms, evidence collected by the Leviathan Security Group suggests that data localization laws could increase IT costs by 30 to 60 percent.[15] Oxford Economics finds that if the global infrastructure gap were filled, global GDP could increase by $2.7 trillion.[16]

1 Sherman Robinson, Zhi Wang, and Will Martin, "Capturing the implications of services trade liberalization," *Economic System Research,* 2002, Volume 14, Issue 1.
2 Oleksandr Shepotylo and Volodymyr Vakhitov, *Impact of services liberalization on productivity of manufacturing firms: Evidence from Ukrainian firm-level data,* discussion paper number 45, Kyiv School of Economics, 2011.
3 Denise Eby Konan and Keith E. Maskus, *Quantifying the Impact of services liberalization in a developing country,* policy research working paper number 3193, World Bank, 2004.
4 Aaditya Mattoo, Randeep Rathindran, and Arvind Subramanian, *Measuring services trade liberalization and its impact on economic growth: An illustration (English),* policy research working paper WPS2655, World Bank, 2001.
5 W. Raphael Lam et al., *Resolving China's zombies: Tackling debt and raising productivity,* International Monetary Fund, November 27, 2017.
6 Chang-Tai Hsieh and Peter J. Klenow, "Misallocation and manufacturing TFP in China and India," *The Quarterly Journal of Economics,* November 1, 2009, Volume 124, Issue 4.
7 Zheng (Michael) Song and Guiying Laura Wu, *Identifying capital misallocation,* January 2015.
8 Sally Chen and Joong Shik Kang, *Credit booms—is China different?,* International Monetary Fund, January 5, 2018.
9 Simon Dietz and Sam Fankhauser, *An economic solution to climate change that could save trillions,* The London School of Economics and Political Science, 2014.
10 Terry Barker and Katie Jenkins, *The costs of avoiding dangerous climate change: Estimates derived from a meta-analysis of the literature,* United Nations Development Programme, 2007.
11 *Investing in climate, investing in growth,* Organisation for Economic Co-operation and Development, June 2017.
12 Tom Kompas, Van Ha Pham, and Tyong Nhu Che, "The effects of climate change on GDP by country and the global economic gains from complying with the Paris Climate Accord," *Earth's Future,* Volume 6, Issue 8, July 13, 2018.
13 Robert Pepper, John Garrity, and Connie LaSalle, "Cross-border data flows, digital innovation, and economic growth," in *Global information technology report 2016,* World Economic Forum, 2016.
14 Erik van der Marel, Hosuk Lee-Makiyama, and Matthias Bauer, *The costs of data localization: A friendly fire on economic recovery,* European Center for International Political Economy, May 2014.
15 *Quantifying the cost of forced localization,* Leviathan Security Group, 2015.
16 *Global infrastructure outlook,* Oxford Economics, July 2017.

Technology. One study found a direct link between technological diffusion with TFP convergence between "lagging countries" and "technology leaders."[1] To quantify this, one study estimated that joint ventures between foreign and Chinese firms have 29 percent higher productivity than those between local peers, and that the presence of foreign firms is creating competitive pressure on local companies that should lead to an improvement in their performance.[2] Another study attributed 1.5 to 3.7 percent TFP growth in "East Asian Tigers" (Singapore, Hong Kong, Taiwan, and South Korea) to greater adoption of foreign technology.[3]

Step 3: Synthesize results from external research using a combination of McKinsey's Global Growth Model (GGM) and external modeling to simulate global GDP in scenarios of less and more global engagement

The two scenarios—less and more engagement—were then compared with a 2040 baseline scenario in the GGM, which uses time-series trends to build forward-looking scenarios of the global economy on the basis of long-term trends, including changes in population structure, productivity growth, and trade. For historical data sets, we used time series between 1980 and 2016. We built equations based on the production function of over 100 economies. The difference between the two scenarios and a baseline scenario represents the upside opportunity and downside risk of more and less engagement, respectively.

Adjust macroeconomic variables in the GGM. McKinsey's GGM uses a general equilibrium calculation to generate forecasts of scenarios, using a combination of more than 100 macroeconomic indicators. We modeled different "shocks" implied by the scenarios of less and more engagement on key input variables including total factor productivity, capital productivity, commercial interest rates, consumption prices of goods, and investment.

Separate modeling for other specific areas. In areas where it was not possible to calibrate aspects of engagement with variables in the GGM (for example, the impact of more or less provision of global public goods), we combined the results of our modeling with external simulations.

1 David E. Bloom, David Canning, and Jaypee Sevilla, *Technological diffusion, conditional convergence, and economic growth,* NBER working paper number 8713, National Bureau of Economic Research, January 2002.
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